DOCUMENT RESUME

ED 107 011 95 EC 072 453

AUTHOR	Wozniak, R. H.
TITLE	Psychology and Education of the Learning Disabled Child in the Soviet Union. Research Report No. 78.
INSTITUTION	Minnesota Univ., Minneapolis. Research, Development, and Demonstration Center in Education of Handicapped Children.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
REPORT NO	332189
PUB DATE	Dec 74
GRANT	OEG-09-332189-4533(032)
NOTE	142p.
EDRS PRICE	MF-$0.76 HC-$6.97 PLUS POSTAGE
DESCRIPTORS	Clinical Diagnosis; *Educational Methods; *Educational Philosophy; Educational Planning; Exceptional Child Education; *Foreign Countries; *Learning Disabilities; Research Needs
IDENTIFIERS	Union of Soviet Socialist Republics; USSR

ABSTRACT

The author surveys the status in the USSR of educational programing and psychological research with learning disabled children who are classified as temporarily retarded in psychological development (TRPD). Education and psychology in the USSR are said to be marked by the following major characteristics: a strong emphasis on the importance of practical activity; a concomitant emphasis on the importance of conscious knowledge in the direction of human activity; genetic, sociocultural, and neuropsychological perspectives; and a complete rejection of standardized intelligence testing in favor of clinical diagnosis. The coordination of research efforts by the Scientific Research Institute of Defectology is explained. Clinical characteristics are identified in extensive detail for three common diagnostic categories: TRPD, cerebro-asthenic syndrome, and psychological infantilism. Psychological and psychophysiological research is thought to contribute to the improvement of multifaceted differential diagnosis and to provide information concerning the development of children's processing capacities essential for the design of effective instructional materials and methods. The author envisions Soviet educational programing moving quickly from the experimental state to the provision of broad scale instructional programs tailored to learning disabled children. (GW)

ED107011

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM
THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS
STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF
EDUCATION POSITION OR POLICY

RESEARCH REPORT #78

Project No. 332189
Grant No. OE-09-332189-4533 (032)

PSYCHOLOGY AND EDUCATION OF THE LEARNING DISABLED CHILD IN THE SOVIET UNION

R. H. Wozniak
University of Minnesota

Research, Development and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

December 1974

The research reported herein was performed pursuant to a grant from the Bureau of Education for the Handicapped, U.S. Office of Education, Department of Health, Education and Welfare to the Center of Research, Development and Demonstration in Education of Handicapped Children, Department of Psychoeducational Studies, University of Minnesota. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

Department of Health, Education and Welfare

U. S. Office of Education

Bureau of Education for the Handicapped

EC 072 453

2/3

RESEARCH AND DEVELOPMENT CENTER
IN EDUCATION OF HANDICAPPED CHILDREN
Department of Special Education
Pattee Hall, University of Minnesota, Minneapolis, Minnesota 55455

The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

Dr. Robert Wozniak's office address is:
Institute of Child Development
University of Minnesota
Minneapolis, Minnesota 55455

Psychology of the learning disabled child in the Soviet Union. In Wm. Cruikshank and D. P. Hallahan (Eds.), Research and Theory in Minimal Cerebral Dysfunction and Learning Disability. Syracuse: Syracuse University Press, in press, 1975.

Psychology and Education of the Learning Disabled Child in the Soviet Union

R. H. Wozniak[1, 2]
Institute of Child Development
University of Minnesota

While education of the handicapped child in the Soviet Union is an old and well-established discipline (D'iachkov, 1968), educational programming and psychological research with children specifically classified as "temporarily retarded in psychological development" (TRPD), the closest Soviet equivalent to "learning disabled," is of relatively recent origin. Thus, the first major conference convened for the specific purpose of considering the physiological, psychological and pedagogical characteristics of children with TRPD was held only five years ago, in 1969, under the auspices of the National Institute of Defectology. The proceedings of this conference, published under the title[3] "Children with Temporary Retardation in Development" (Vlasova and Pevzner, 1971), consisted primarily of reports of research of a clinical and pedagogical nature. The primary emphasis in these reports was placed on issues of syndrome definition, classification, and differential diagnosis, topics which continue to command a major share of the attention of Soviet defectologists.

In the period since this first conference, however, a number of experimental psychological investigations of the performance of TRPD children, usually

---

[1] The preparation of portions of this review was supported by the University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children on grant #OE-09-332189-4533 (032) from the Bureau of Education for the Handicapped, U.S. Office of Education and by the University of Minnesota Office of International Programs.

[2] The author wishes to express his thanks to Professor I. Wirzup of the University of Chicago Survey of Recent Eastern European Literature in School and College Mathematics for his assistance in making available some of the published Russian material on which this article is based.

[3] Titles of Russian articles mentioned in the text will always be given in their English equivalents.

in comparison to that of their successfully achieving and/or mentally retarded (MR) age mates have also been reported. Although such studies are still by no means numerous, they are extremely varied, focusing on individual differences in attention, visual perception, memory, auditory and visual comprehension, and other psychological processes identified as possible loci for learning disabilities associated with school failure. Furthermore, these studies illustrate a particular psycho-philosophical perspective and orientation toward both educational programming and empirical research which, for the most part, have not been seriously considered in the western literature on the learning disabled child.

In order to deal as broadly as possible with all of these various aspects of Soviet work on TRPD, this review will be organized into a number of major sections. The first section will provide an overview of the general perspective and overall structure of Soviet special education (with particular reference to learning disabilities) and its relationship to Soviet psychology and philosophy. The second section will concentrate on issues involved in the definition of the TRPD syndrome and in the clinical characterization of TRPD as it has been outlined in the Soviet literature. This will then be followed in turn by a summary of the Soviet theoretical approach to and research on problems of differential diagnosis, an illustrative review of the published pedagogical and experimental psychological research with TRPD children, and, lastly, a brief account of the basic principles of Soviet educational programming for children with learning problems. Hopefully, this approach will provide the reader with an opportunity to view current and future Soviet research on learning disabilities in its proper historical, psychological and educational context.

The Nature of Soviet Special Education and its Relationship to Soviet Psychology and Philosophy

In the Soviet Union, as perhaps nowhere else, philosophical considerations have strongly influenced psychological theory (cf., Payne, 1968, for an interesting discussion of this interaction); and psychological theory has, in turn, helped to determine educational practice. Educational method, in other words, has to a great extent been explicitly justified in terms of the major characteristics of the Soviet view of the psychological development of man, which, in turn, has been justified by a reasonably coherent and unified set of underlying philosophical principles. This interdependence among philosophical, psychological, and educational principles is one of the most striking characteristics of Soviet research in the psychology and education of the handicapped child. When it is taken together with the fact that Soviet psychological theory contains many points of similarity with the most recent trends in Western developmental psychology such as the Piagetian movement and interest in information processing (Wozniak, 1975), it suggests the potential fruitfulness of closely examining Soviet special educational techniques. A summary of the major characteristics of current thinking in Soviet psychology and its philosophical determinants with examples of the implications of such thinking for education of the handicapped child will now be presented. This will then be followed by a brief sketch of the institutional organization of Soviet special education.

Intellectual Organization of Soviet Special Education and Psycho-Educational Research

In general, education and psychology in the USSR are marked by the following major characteristics: 1) a strong emphasis on the importance of practical activity in an objective physical and social world in the development of knowledge; 2) a concomitant emphasis on the importance of conscious knowledge in the direction of human activity; 3) a dialectical, genetic perspective which argues that intelligent human action can only be understood in its development, and that development proceeds by stages, and as an active process; 4) a sociocultural perspective which emphasizes the importance of adult-child social interactions (particularly those involving the linguistic systematization of cultural knowledge) in the determination of the child's developing intelligent activity; 5) a neuropsychological perspective which dictates that whatever neurological knowledge exists must be taken into account in understanding psychological phenomena, but without in any way reducing the psychological determinants to underlying neurological ones; and 6) a complete rejection of standardized intelligence testing in favor of a clinical approach to individual diagnosis.

Practical Activity in the Development of Knowledge. Soviet philosophy (Lenin, 1927) assumes both the existence of a real material world independent of any knowing subject and the progressive adequacy of both the individual's and the society's knowledge of that world over time. Both the source and the criterion of adequate knowledge is practical activity. Human action in a real world develops and corrects man's knowledge. For psychology, this implies that an understanding of the characteristics of human thinking can be obtained through an analysis of intelligent activity. The structure of human action becomes the structure of human thought (Leont'ev, 1972). For education in general, and special education in particular, this emphasis on action means both that diagnosis of the nature of a child's developmental disabilities must rely on an analysis of his patterns of activity and that interventive remedial efforts must include the active manipulation of concrete materials in meaningful, ecologically valid situations. Vocational training is, of course, seen in this light (D'iachkov, 1964). However, non vocational, academic programs must also be designed around practical, life-like experiences for the child if, in the Soviet view, they are to attain their objective of developing the child's cognitive capabilities.

Conscious Knowledge in the Direction of Human Activity. Just as practical activity serves to correct and develop human consciousness, conscious knowledge is seen as guiding and directing the activity by which man alters his own environment and consequently becomes capable of self development (Simon, 1957; Gal'perin, 1957). For Soviet psychology, this implies that the study of behavior by itself, apart from a description of the knowledge which guides and directs that behavior, is fruitless. A proper understanding of human action can only come through study of that action as intelligent, knowledge-guided action. For special education, this implies that interventive techniques which attempt to deal only with surface behavior while ignoring the child's understanding of what is expected of him in a situation must be eschewed. For behavior to be deemed adequate and intelligent, the child must comprehend what he does and why he does it.

Dialectical, Genetic Perspective. Dialectical materialism is founded on the assumption that all that exists exists in a state of constant alteration and development and that the form of this development is described by three laws referred to as the "laws of the dialectic" (Afanas'ev, 1968). Very briefly, according to these three laws, development is both continuous and discrete. It consists of gradual quantitative change which gives rise to sudden qualitative changes in which phenomena become determined by new sets of laws to which they were not previously subject. Such development occurs as a process of the resolution of internal contradictory tendencies in a phenomenon. Hence the motive force for development lies within a phenomenon rather than in its surroundings. Lastly, development not only occurs by stages, but new stages integrate previous stages so that characteristics which exist at a lower stage reappear at higher stages in a continuous progression.

The implications for psychology of the notions of constant alteration and of development corresponding to these general characteristics are several. First, in such a system, all psychology must, in an important sense, be developmental psychology. Psychological phenomena can only be properly comprehended in the process of development. Secondly, psychological theory must to a large extent be stage theory. Since development is qualitative as well as quantitative, psychological phenomena are best understood in terms of relatively constant, integral, unities at particular points of a genetic process, or stages. Lastly, psychology must reject models of human intelligence which see it as a passive receiver of sensations, striving to regain a state of equilibrium (as, for example, in drive-reduction theories of motivation). The psychological organism is an active unity which carries within it the motive force of its own development.

These views may be discerned in a number of areas of Soviet work with handicapped children. For example, the severity and the source of handicaps are generally classified on the basis of qualitative differences in performance in complex tasks rather than on quantitative differences such as the number correct on a psychometric instrument (Luria, 1961). In the design of educational interventions, the principle of constant alteration and development leads Soviet educators to adopt the strong attitude that development never ceases, even for a child whose progress may be extremely slow. In addition, development is seen as stagebound, progressing through a number of "zones." The task of the teacher of the handicapped child is to help the child systematically lead himself through this developmental progression. The notion of the child "leading himself" with adult help also comes from the principles of dialectics, which assert that development is an internal principle. Development is in fact self-development, and one of the major emphases in Soviet special educational work is to assist the handicapped child in achieving the means to continue developing himself.

Socio-Cultural Perspective. The notion of group labor, out of which society, language and culture evolved as means through which man can change the world and consequently alter and develop his own consciousness, is of primary importance in Marxist thought. From this perspective, Vygotsky (Leont'ev and Luria, 1968) developed a socio-cultural theory of cognitive development which continues to influence most of special educational practice in the Soviet Union. Specifically, Vygotsky noted the importance of what he termed "cultural mediators" (of which language is the most important) which are employed in social intercourse as socially developed aids in relating to reality and as the primary means by which the child comes to regulate his own higher mental functions. Words and other social mediators possess the unique characteristic, in Vygotsky's view, that they are always a 'sign', a reflection of something. It is in employing such signs that man becomes capable of easily introducing changes into external reality which in turn reflect back upon and develop his consciousness. By altering his medium, man is able to regulate his own behavior and control his own psychic functioning. He is no longer dependent on the reality of the external situation.

In discussing the ontogenesis of this regulatory process, Vygotsky (1962) asserted (and Soviet theory continues to rely heavily on this notion) that all specifically mediated human mental processes arise only in the course of social activity, in the process of cooperation and social intercourse. Psychological functions at first shared between two people, in particular between a child and an adult, become the internalized psychological processes of one person (in particular the child). Thus the structure of mental processes is at first present in man's external social activity and only later becomes internalized as the structure of his inner mental functions (e.g., egocentric speech is internalized as inner speech or verbal thought).

These notions figure prominently in both the classification and training of Soviet children with lowered intellectual functioning. For example, one major method (Luria, 1961; Egorova, 1969; Tsymbaliuk, 1973) of distinguishing among the three categories of functioning--"normal," "TRPD" and "MR"--is to present the child with a task which requires that he supply missing organization to the materials. In such a situation, appropriately aged children who are functioning normally will be capable of providing some of the missing organization themselves, but TRPD and MR children will not. If, however, the same task is then presented again with increasing levels of adult organizational intervention (in which the adult provides the child with certain prompts in an attempt to help him to organize the information in the task), the TRPD child who may perform much more poorly than the normal child without such prompts, is capable of improving his performance virtually to a normal level through utilization of this additional organizing information. MRs, on the other hand, will generally be unable to take maximum advantage of the increased social organizational information to increase their performance. This is one method, therefore, which is said to be useful in the sub-classification and accurate reassignment of children who are functioning unsuccessfully in the regular classroom.

Similarly, interventive methods for use with the handicapped child are very much oriented toward producing carefully designed adult-child interaction patterns which the child can internalize as modes of cognitive functioning for himself. The importance of adult-child interaction is in the very low adult-child ratio in Soviet schools for the handicapped.[4]

Psycho-Neurological Perspective. Psychological phenomena are seen from the Soviet perspective as very closely linked not only to the real physical world which the knower gradually comes to know but to underlying neurological functioning (referred to as "higher nervous activity") as well (Payne, 1968). This point of view is manifest in the level of attention in the Soviet literature to questions of neuropsychology in which various types of behavioral dysfunctions have been studied in their relationship to respective forms of organic brain damage (Luria, 1932, 1966, 1973) and in a reliance on many of the ideas of Pavlov (1941) in the formulation of psychological theory. Soviet psychologists are careful to stress that psychology cannot be reduced to physiology; but physiological laws and facts must be taken into account in any adequate psychological conceptualization.

In Soviet special education, this perspective is perhaps most clearly reflected in the lengthy and careful clinical diagnostic procedure through which the organic etiology of particular handicaps in children is diagnosed. As a rule, such a diagnosis always includes medical and neuropsychological examination in which the possibility and localization of organic etiology is explored (cf., Pevzner, 1961, for an example of the multi-faceted nature of the

---

[4] Report of a 1973 joint United States Soviet Union Seminar on the Instruction of the Handicapped held in Moscow and co-sponsored by the Council for Exceptional Children and the Bureau of Education for the Handicapped. The Report was presented orally at a one day conference in Racine, Wisconsin April 12, 1973.

Soviet diagnostic approach). This information is then employed along with more specifically psychological information about the child's action patterns to determine placement and to a large extent even the course of the child's training. In addition, under the influence of the neuropsychological and Pavlovian perspectives, Soviet training programs stress the concept of "compensatory mechanisms," a notion (Luria and Tsvetkova, 1966) which derives from the idea that portions of the brain which are functioning adequately may in time take over some of the functions normally assigned to brain areas which have received partial lesions. The concept has an important implication for Soviet special education. A careful teacher may employ a child's areas of developmental strength to build up his areas of developmental weakness.

Lack of Standardized Aptitude Testing. For reasons derived from the philosophical positions discussed above, Soviet theorists (e.g., Lebedinskii and Miasishchev, 1966) criticize the use of standardized intelligence assessment. Standardized intelligence tests, they argue, rarely stress appropriately the child's active manipulation of meaningful objects. Rather, such tests, for purposes of standardization, must place the child in what Soviet psychologists consider highly rigid, static, and artificial situations which deny the child the flexibility of utilizing the skills that he does possess to compensate in part for those which he does not (and hence the Soviets would claim, the examiner finds out very little of interest about either). Furthermore, standardized intelligence tests result primarily in quantitative rather than qualitative assessment of the individual child and hence stress the continuities in development at the expense of the equally important discontinuities. Lastly, standardized psychometric testing drastically restricts the form of or even entirely eliminates adult-child interactions; and in general, the procedure thus leads to a tendency to fail to take account of important neuropsychological information.

In the place of standardized psychometric evaluation, Soviet psychologists and educators typically employ a multi-faceted, clinical assessment in which doctor, neuropsychologist, speech therapist, hearing specialist, teacher and whatever other personnel might be indicated (all are often present for each examination) examine the capabilities of the child and arrive at a consensual diagnosis.

Institutional Organization of Soviet Special Education and Psycho-Educational Research

The Scientific Research Institute of Defectology of the Academy of Pedagogical Sciences of the Soviet Union, established as such in Moscow in 1944[5], is the primary agency in the USSR responsible for the planning and coordination of research on the learning and teaching of handicapped children. The Institute of Defectology is broadly interdisciplinary in nature, housing clinical, neurophysiological, psychological and educational researchers whose coordinated aim is to achieve the "maximally complete disclosure of general patterns in development of all anomalous children, as well as those specific features which are inherent in each type of anomaly [...and the design of] the most effective ways of correcting and compensating these conditions" (Vlasova, 1972, page 23). Operationally, these goals translate into the conduct of psycho-educational research and the coordination of programming for a differentiated system of special schools for children with various types of handicaps. Beginning with the second, each of these functions of the Institute of Defectology will be briefly discussed.

---

[5] By virtue of a reorganization and broadening of the already existing Experimental Defectological Institute.

Organization of a System of Special Schools. As might be expected, children with the most serious handicaps (the deaf, the blind, and the severly mentally retarded) were historically the first to receive the special attention of Soviet psychologists and educators (cf., Zemtsova, 1969; Shif, 1969 for reviews of some of this early research); and work with these children has been proceeding since the late twenties and early thirties. It has, on the other hand, been only rather recently (D'iachkov, 1964) that children with partial handicaps (the hearing and visually impaired, the learning disabled) have become the focus of coordinated psycho-educational effort. Concomitant with this increased interest, pressure has developed in Soviet governmental and scientific circles for the organization of a well-differentiated system of schooling for children with various classes of handicaps. Thus, under a recently completed Five-year Plan, the Institute of Defectology was given the responsibility of overseeing the establishment of a scientifically designed, differentiated network of special schools with separately maintained programs for the profoundly deaf, the hearing impaired, the blind, the visually impaired, the mentally retarded, children with severe speech defects, and children with major motor disturbances (D'iachkov, 1964). Each type of school was to have its own rules, curricula, syllabi, texts, and teaching methods manuals.

The general principles for the establishment of such a system of separate schools were finally provided by the Institute of Defectology in 1965, with the publication of an edited monograph entitled "Principles of the Education and Rearing of Abnormal Children" (D'iachkov, 1965). Although considerable progress in establishing such a network of special schools has apparently been made (Vlasova, 1972), implementation of the Five-year Plan directives has not yet been uniformly accomplished throughout all of the Union Republics, nor have differentiated pre schools or evening schools for adults yet been widely established. In regions in which a full complement of special schools still does not exist, the minimally handicapped typically either continue to attend the regular school or are sent to schools designed for the severely handicapped or to auxiliary[6] schools for the mentally retarded (Vlasova, 1971). This practice has been the target of continued, severe criticism over a period of years (D'iachkov, 1964, 1968, Vlasova, 1971). This criticism is generally based on the argument that in the former case, in which the minimally handicapped are kept in the regular school, they usually do not receive sufficient appropriate special help and drop rapidly behind in their studies; while in the later case, in which such children are sent to schools for the seriously handicapped or to auxiliary schools for the retarded, the programs which are available to such students are not sufficiently demanding to allow the minimally handicapped to develop their full potential. As will be noted shortly, this argument, although with a slightly different twist, has been particularly stressed with respect to children with TRPD.

Several characteristics of the broad educational goals of the Soviet special schools are worthy of note since they are common to all educational efforts with handicapped children, regardless of the form of the handicap. The first such characteristic is a strong attempt to provide the handicapped child with a general education equivalent in scope to that which normal children receive in the regular eight-year curriculum. Thus, though it may require that the handicapped child be assigned to a twelve-year program, it is official policy (Vlasova, 1972) that in all of the special schools except the auxiliary schools for the mentally retarded, the child should be provided with a full curriculum.

---

[6] The term "auxiliary school" as it appears in the Soviet literature is occassionally confusing since it seems at times to be synonomous with "school for the mentally retarded" and at other times to be used more broadly, as "school for the handicapped." This ambiguity arises from the fact that differentiated schooling is a recent phenomenon, and, as noted, certain regions of the USSR still routinely send the minimally perceptually handicapped and TRPD children to auxiliary schools. As this practice gradually ceases, however, the term "auxiliary school" will come more and more to be used only in reference to schools for the mentally retarded.

Second, since the 1924 All-Russian Congress on the Social and Legal Protection of Children and Adolescents (D'iachkov, 1964), it has been Soviet policy that general instruction be combined with specific vocational training in the special schools in order to maximize the likelihood that handicapped children will develop their full capacity for socially useful labor. It is typical in many programs for a student's vocational training to be tied to a specific industry, with considerable on-the-job experience out in the industrial setting during the term of special schooling and with automatic job placement after graduation. Despite the emphasis on vocational training, however, it is also official policy that such training never be accomplished at the expense of a general education. Rather the two are expected to be carefully coordinated (D'iachkov, 1964, 1965, 1968).

Third, entrance to the special schools is to be gained only on the basis of verified organic etiology, after careful clinical, neuropsychological and psycho-educational diagnostic evaluation (Pevzner, 1966). In no instance is the simple failure of the child to perform successfully in the regular classroom in the early grades to be taken as an immediate signal that the child requires special schooling. Children whose sensory capacities are within the normal range, and for whom there is no clear evidence of an organically based mental retardation are to be kept in the regular schools (D'iachkov, 1964, 1968; Vlasova, 1971; Zabramna, 1971), where they are to be given special, individualized, educational experiences either within the regular classroom or within special classrooms within the regular school. As might be expected, this category is composed largely of children with TRPD; and a strong argument has been made for distinguishing these children from MRs in order that they may be kept in the regular school and provided with an educational regime geared to develop their full potential, a potential which is assumed to extend well into the normal range.

Conduct of Psycho-Educational Research. Under the aegis of the Institute of Defectology, psycho-educational research with the handicapped typically has proceeded along four major routes: 1) careful clinical assessment and description of the distinguishing psycho-pedagogical characteristics of particular categories of handicapped children; 2) development of techniques for differential diagnosis and appropriate assignment of children to special schools or to special programs within the regular school; 3) the development of curriculum materials suitably tailored to children with specific handicaps; and 4) general experimental research into the nature of the psychological functioning specific to various handicapped populations. Each of these research routes will be taken up in turn in some detail in the remaining four sections of this review.

However, before proceeding to these discussions, where each type of research will be dealt with in relative isolation from the others, it is extremely important to point out that in the Soviet Union, as in few other countries, clinical description, test development, curriculum design and evaluation, and psychological research do not proceed independently. Rather, through the central coordinating function of the Institute of Defectology, clinical description and basic research are directed primarily at providing information of immediate value to those developing differential diagnostic techniques and designing curriculum materials and methods manuals (Vlasova, 1972). Furthermore, (and this is particularly uncommon in many other countries), the problems encountered by teachers implementing methods and materials in the classroom tend to filter back fairly quickly to those engaged in research to provide the problems and hypotheses for future investigation. Although it appears clear that Soviet research has by no means yet achieved the philosophically dictated goal of complete interaction between the production of knowledge in research to guide practical educational activity, on the one hand, and the corrective effect of the application of knowledge in practical action on the production of knowledge in research on the other, it is nonetheless equally clear that such an interaction exists, that it strongly conditions both research and practice, and that it is an overriding concern of Soviet psycho-educational science.

Clinical Characteristics of Children With Temporary Retardation in Psychological Development

In the Soviet literature on the psychological characteristics of children with learning problems, three diagnostic categories are commonly encountered. These are "temporary retardation in psychological development," "cerebro-asthenic syndrome," and "psychological infantilism." The first, as previously mentioned, appears to be the closest Soviet equivalent to the term "learning disabled." The second, "cerebro-asthenic syndrome," would appear to be employed in much the same way that "minimal brain dysfunction" is currently used in the Western literature; and the third "psychological infantilism" appears to be a slightly narrower and more specific version of what is also sometimes referred to in the west as "infantilism." Each of these will be discussed in turn with a brief concluding section on the prevalence and etiological characteristics of these three diagnostic categories.

Temporary Retardation in Psychological Development

The Soviet Dictionary of Defectology (D'iachkov, 1970) defines the term "retardation in psychological development" as follows:

"A disturbance in the normal rate of psychological development, as a result of which the child, reaching school age, continues to remain under the influence of preschool and of play interests. With a retardation in psychological development, children are unable to take part in school activities, to begin school tasks and to complete them. They behave in class as though they were in a play group in a kindergarten or at home.

"Children with a temporary retardation in psychological development are often erroneously considered to be mentally retarded...The difference between these two groups involves two characteristics. Although children with a retardation in psychological development have difficulty in mastering elementary reading, writing and arthmetic skills, this is combined with a relatively well developed language ability, considerably higher aptitudes for remembering verse and stories and with a higher level of development of cognitive activity. This combination is not characteristic of the mentally retarded. Also children with temporary retardation in psychological development are always able to take advantage of help given them while they are working, mastering the principle of solution of a task and transferring this principle to the execution of another similar task. This shows that they possess a full capacity for further development, i.e., they will subsequently be able to execute independently that which, in the special instructional situation, they are presently able to complete only with the teacher's assistance. Prolonged observations of children with retarded psychological development showed that it is precisely this ability to utilize assistance when it is offered and to apply their learning intelligently in the process of future instruction that results in their eventually being able to learn successfully in the regular school" (page 111).[7]

A number of characteristics of the above definition are, obviously, of interest. First and foremost, a child with TRPD is a child who is failing at mastery of basic school skills, but who is not mentally retarded. The mention of this primary characteristic is so ubiquitous in the Soviet literature (D'iachkov, 1968; Pevzner, 1966; Vlasova, 1971, 1972; Zabramna, 1971) as to suggest that it constitutes the defining attribute of the diagnostic category. In addition to school failure and a normal range of intellectual ability, the TRPD child, as noted above, has a relatively well developed level of language skill; and, although it is not mentioned specifically in the above definition, it is clear from other sources (Luria, 1961; Vlasova, 1971; Zabramna, 1971) that to be labeled TRPD, a child must as well have completely intact sensory abilities.

From this composite definition: 1) average to above average intellectual capacities; 2) adequate sensory acuities; 3) no obvious major language deficiency; and 4) a level of school achievement much lower than would be expected on the basis of the above three characteristics, it would appear that the term "TRPD" is used in the Soviet Union in much the same way in which the term "learning disabled" is employed in a substantial portion of the Western literature (cf., Gearhart, 1973, for a discussion of the category "learning disabled"). It is also worth noting that, although as shall shortly be mentioned, cerebral dysfunction is, in the Soviet view, an integral part of TRPD for many children, it is learning disability rather than cerebral dysfunction per se which is stressed in applying the diagnostic label TRPD to a particular child.

In addition to TRPD, one also encounters the terms "psychological infantilism" and "cerebro-asthenic syndrome" used in relation to children failing in school. This is illustrated by the following quotation from Pevzner (1972):

---

[7] Unless otherwise noted, all translations from previously untranslated Russian sources are this author's.

"Among school failures, particularly in the youngest class, we often find children with disturbances in development. Studying them at one of the general schools in Moscow, we discovered among them a group of children with psychophysical and psychological infantilism as well as a group with cerebro-asthenic states of various origins (page 3). It would appear from this and from other sources (Raiskaiia, Iavkin, and Egorova, 1969; Reidiboim, 1972) that "psychophysical and psychological infantilism" (PI) and "cerebro-asthenic syndrome" (CA) are essentially non-overlapping (though by no means mutually exclusive) sub categories of TRPD.

Cerebro-Asthenic Syndrome

Turning once again to the Soviet Defectological Dictionary (D'iachkov, 1970), one finds the following definition of "asthenic syndrome":[8]

"A condition of neuropsychological weakness in which the tone of the nervous processes is affected, their [the children's] very rapid exhaustion under any kind of activity, an inability for lengthy nervous concentration, and a lowering of all forms of psychological activity is observed.

"Moderate asthenic syndrome is characterized by an irritability in conjunction with an increased excitability and very rapid extinction of elicited reactions. Severe asthenic syndrome is characterized by passivity, lack of receptivity to external stimulation, apathy, and depression. In the patient one observes prolonged headaches, disturbance of normal sleep, and disturbance in vegetative nervous processes. Asthenic patients are disturbed by noises of average volume and by bright lights. Their mood is very easily changed and negative reactions are common, including alarm, irritability, dissatisfaction and sometimes weeping without cause" (page 25).

---

[8] The term "asthenic" is apparently broader than the term "cerebro-asthenic," referring to a general nervous weakness displayed in any kind of activity. However, the two terms seem to be used fairly interchangeably when reference is being made to characteristics of asthenic states which are manifested in intellectual activities.

To this definition, Reidiboim (1972) adds that in CA, early organic afflictions of a traumatic character often give rise to "disturbances of the normal correlation of excitation and inhibition [in the brain]. Clinically, this shows up as irritability, mild excitability, capriciousness, motor anxiety, fatigue, lowering of the capacity for work, poor concentration of attention and absent-mindedness" (page 16).

Commenting on the pedagogical characteristics of the CA child, Ivanov (1971) notes that "in an overwhelming number of instances, asthenic conditions... are not diagnosed in proper time...parents assume that this is simply a discipline problem...slow progress [in school] is assumed to be an inability...and such children may even mistakenly be admitted to auxiliary schools...attentional transfer particularly suffers; and higher forms of memory (e.g., logical memory), ability to form serial orders and voluntary behavior are all weakened. In a large proportion of the children, heightened fatigue and exhaustion during the time for lessons is manifested not in a simple 'turning off' but in an impellent agitation, hyperactivity...observant teachers describe the behavior of such children at lessons in the following way: '...can't sit through a lesson in its entirety; already within 10-15 minutes, he doesn't listen, begins to fidget, keeps placing his notebook somewhere else, becomes a nuisance to his desk partner...hardly responds to remarks' (page 65).

From this and other sources containing long clinical descriptions of cerebro-asthenic TRPD (Dem'ianov, 1971; Daulianskene, 1973) it would appear that the term is used to refer primarily to a collection of behavioral characteristics of a sub class of children who are learning disabled with the clear implication that these behavioral characteristics are a direct result of functional disturbances in the brain. In this way, CA appears to be the closest Soviet equivalent to the concept of "minimal brain dysfunction" as it is currently used in the West (e.g., Wender, 1971).

Psychological Infantilism

Again according to the Soviet Defectological Dictionary (D'iachkov, 1970), "infantilism" may be defined as a "...retardation in the development of an organism. The most vivid symptom is the retardation of physical growth, and in this condition the childlike proportions of the body are usually retained. In infantilism,...the mind usually functions below age level" (page 136). Pevzner (1972) notes that although clinicians have long focused on a series of deleterious factors in the intrauterine as well as the early post natal period of the child's life which disturb the rate of development and that this has resulted in the isolation of the psychological and psychophysical syndrome of infantilism, a number of authors, most notably Bleuler,have applied the term "infantilism" to a variety of intellectual deficiencies, including even mental retardation.

For Soviet psychologists (Vygotsky, cited in Pevzner, 1972), on the other hand, "psychological infantilism" refers more narrowly to the appearance at any age level of intellectual traits characteristic of an earlier period as a function of disturbances in transition from one developmental stage to another, in which the child might develop certain traits peculiar to a higher stage but retain the basic pattern of organization of psychological processes characteristic of the earlier stage. Reidiboim (1972) describes the child with PI in the following way: "In psychological infantilism, children are highly sensitive, their emotional experiences are superficial, their attention wavers, their inquiry is on the level of preschool interests, their main forms of activity are play....Often features of infantilism are combined with physical immaturity.... [and] although motor activity is adequate, a series of tests carried out correctly in spontaneous activity turns out to be impossible to execute under direct instruction" (page 16).

Prevalence, Distribution and Etiological Characteristics of Diagnostic Classifications. According to Reidiboim (1972), about 10 to 11% of school-age children in the Soviet Union experience difficulties in academic activities. The mentally retarded number 3½%, while the remaining 7% can likely be grouped as TRPD. In a study by Reidiboim (1972), 87 children age 8-11 with diagnosed TRPD were thoroughly examined using clinical, neuro-psychological, and experimental psychological procedures and, in addition, were observed over a long period of time in the classroom. On the basis of this intensive examination, 16 children were diagnosed as clear-cut cases of PI, 48 as clearly CA and 23 as mixed PI and CA. This suggests that simple PI probably occurs rather rarely in the general population (in the neighborhood of 1%) while CA is likely to be considerably more common (ranging up to 4% of the population). In addition, Reidiboim reports that the leading etiological factors in all three groups were toxicoses of pregnancy and infectious and somatic illnesses in early childhood.

Differential Diagnosis

A number of factors which have already been briefly noted conspire to make questions of differential diagnosis in general and differentiation of TRPD from mental retardation in particular focal points of Soviet defectological research. First, it is the Soviet view that children with different forms of handicap have, as a result, qualitative differences in aspects of their psychological organization. A knowledge of the form of these differences is seen as essential to the successful design of curriculum materials and methods. The development of differential diagnostic techniques contributes important information to this knowledge base.

Second, differences in the psychological organization of children with varied handicaps have prompted the establishment in the Soviet Union of a differentiated network of special schools tailored to provide programs appropriate to special needs. The existence of such a system, however, immediately implies the necessity of large-scale decision-making regarding placement. Techniques for differential diagnosis are, obviously, central to any such placement process.

Third, based on the belief that the learning disabled child is only *temporarily* retarded in development, it is current Soviet policy to provide such children with special individualized assistance in the regular school rather than to transfer them to auxiliary schools for the mentally retarded. This, together with the fact that it is admittedly (Pevzner, 1966; Vaizman, 1971) difficult to distinguish TRPD from certain forms of mental retardation (oligophrenia) suggests the necessity for the development of precise and reliable diagnostic methods.

Fourth, Soviet psychologists reject the use of *standardized*, *quantified*, *single administration* psychometric instruments in the diagnostic procedure (Luria, 1958; 1961; Lebedinskii and Myasischev, 1966; Brozek, 1972). The rationale behind their refusal to employ standard intelligence tests will be discussed in some detail below (in the section on experimental psychological evalution). For present purposes, it is sufficient to note that such instruments, whatever their relative value, are not generally available to Soviet clinicians. Consequently, the question of the existence of adequate clinical diagnostic techniques becomes of paramount importance in designing an effective placement procedure.

The impact which all of these factors have had on Soviet defectological research has been substantial. This can easily be seen from the fact that of the total number of articles examined during the course of the preparation of this review, over 70% were, in one way or another, oriented toward the provision of differential diagnostic criteria.

Clearly, therefore, the state of the differential diagnostic art in the USSR is undergoing continuous development. Nonetheless, it is possible to describe it at least as it exists in the literature of the past few years. In general, the approach which is taken to the problem of differential diagnosis is a multi-faceted one which typically includes a medical and psychological history, a physical examination, a neurological examination, tests of sensory acuity, electrophysiological evaluation, tests of higher nervous activity (HNA), psychological evaluation of performance in tasks involving memory and perceptual and cognitive skills, and an extended pedagogical observation and work-up. Possibly the best example of this general approach is provided by Pevzner (1961) in a translated book entitled Oligophrenia, in which a case study approach is used to provide diagnostic criteria for differentiating sub-variants of a general form of mental retardation. Unfortunately, however, a monograph comparable to that of Pevzner on the clinical evaluation of children with TRPD apparently does not yet exist, nor in fact, in this relatively new field, has the research even yet been done which might eventuate in such a detailed treatment. Nonetheless, Reidiboim (1972) has provided an in-depth case study of a single child with TRPD; Pevzner (1966) has edited a monograph dedicated to distinguishing oligophrenia from other sources of school failure (one of which is TRPD); and Zabramna (1971) has included several chapters in an edited book entitled Selection of Children for Auxiliary Schools on the differentiation of children with TRPD from oligophrenics. The general procedures involved in this work and in a few other individual investigations will now be summarized.

History and Physical

In general, this consists of a detailed anamnesis with particular emphasis on parental and medical reports of possible intrauterine insults, complications during pregnancy or birth (particularly toxemia), diseases or traumas during early childhood, retardation in achieving the developmental milestones (sitting, walking, talking, etc.), and general behavioral characteristics. This anamnesis is typically accompanied by a thorough physical examination. Although specific guidelines for the interpretation of anamnestic data or the discovery of physical anomalies do not appear to be readily available and the examiner must apparently rely on his own clinical experience, there are some suggestions in the literature which might be of use. Reidiboim (1972) reports that in a sample of TRPD children so diagnosed on other than etiological grounds, 38% of the children were born of mothers who were toxemic during pregnancy. Unfortunately, comparable data obtained from a sample of oligophrenics and a sample of normal children is not reported.[9] Physical underdevelopment (height, weight, body proportions) is regarded as an important diagnostic sign of possible psychological infantilism (Pevzner, 1972; Reidiboim, 1972); and in cases of cerebro-asthenisis (Reidiboim, 1972), it is suggested that the child may often complain of headaches, occasionally of vertigo and fainting, may experience pains in various parts of his body, disturbances of appetite and sleep patterns. Of course, as also with psychological infantilism, the child's behavior, or aspects of it, will generally correspond to the clinical descriptive picture provided in the previous section of this review.

---

[9] However, data from the 1967 United States Vital Statistics suggests that toxemia only occurs in 6-7% of gravid women, indicating that the percentage of toxemic pregnancies found by Reidiboim among mothers of TRPD children is indeed quite high.

Neurological Examination

Neurological techniques reported in Soviet studies of TRPD (Reidiboim, 1972; Dem'ianov, 1971; Daulianskene, 1973) appear to be fairly standard and similar to those discussed by Pevzner (1961). The results from such studies, however, are quite inconclusive. Dem'ianov (1971), in summarizing results obtained from a sample of 32 TRPD children age 8-11, notes that "as a rule, signs of marked impairment of the brain were not revealed" (page 68). He then goes on to report minor neurological signs exhibited by some few children; but it is unclear that the incidence of these signs is any greater in his sample than it would be in the population at large. Similarly, Reidiboim (1972), in relating a case history of a child with diagnosed psychological infantilism, also reports lack of major neurological symptomatology (an absence of nystagmus, normal pupillary reflexes, accommodation, and convergence, and absence of pathological reflexes).

On the other hand, Daulianskene (1973) reports that in a sample of 138 children with learning difficulties from which children with diagnosed oligophrenia had been excluded, 125 (or about 90%) showed symptoms of organic disease of the nervous system. Unfortunately, however, this rather startling conclusion appears to be somewhat overstated. First, although Daulianskene reports prevalence rates of approximately 30% for various motor coordination problems which might qualify as soft neurological signs, he fails to provide comparable data from blindly rated normal controls, leaving open the possibility that such signs are as common in the general population as they are among children with TRPD. Secondly, for all other prevalence rates which Daulianskene reports and which he includes in computing the 90 percent figure, neuropsychological rather than neurological signs are accepted as evidence of cerebral pathology. Thus, for example, Daulianskene concludes that approximately 36% of his sample manifests pathology in the temporal cortex, but his evidence for this pathology is apparently only the subjects' difficulty in the phonetic analysis of words and inability to distinguish voiced from voiceless sounds. The problem, of course, is that these are themselves taken as major symptoms of learning disability and one clearly cannot argue that learning disability is a result of cortical pathology while simultaneously using the presence of primary symptoms of learning disability as evidence for that cortical pathology.

In summary, therefore, it would appear that in the USSR as in other countries (cf., Wender, 1971, for an interpretive summary of this data), the prevalence of classical neurological signs among children with learning disabilities is probably not great and no greater than in the population as a whole. Soft signs, on the other hand, may be common; but it is decidedly unclear from available Soviet reports whether they are relatively more common among TRPD children than among normals.

Sensory Acuity

Evaluation of sensory acuity is, of course, not particularly relevant to the differentiation of TRPD from mental retardation. As previously noted, however, in the Soviet Union as in other countries, opthamological examination and audiometric testing are an important aspect of placement evaluation since the child's sensory abilities must be in the normal range for him to be retained in the regular school.

Electrophysiological Assessment

Electroencephalography (EEG). In the Soviet Union, EEG evaluation has traditionally been a major component of the differential diagnostic process; and there is evidence (Pevzner, 1961) that in the sub classification of certain abnormalities it may be of value. Nonetheless, as Zislina, Opolinskii and Reidiboim (1972) have noted, there has still been relatively little work in the USSR dedicated to validating EEG techniques in the diagnosis of TRPD; and, according to these authors, the interpretation of the research which does exist is made difficult by the fact that most authors have not examined TRPD children as a separate clinical group.

In order to remedy this situation, Zislina et al. chose for study 40 children ranging in age from 7-10 years, all of whom were diagnosed as TRPD, had repeated the first grade, and were now studying in experimental classes at the Institute of Defectology. Anamnestic data on these children revealed the usual range of clinical and etiological indices of TRPD. Neurological observation turned up no symptoms of any kind in 19 of the 40 children, and scattered soft signs in the remainder. EEG examination was conducted in a darkened room with mono- and bi-polar multi-channel recording from the occipital, sinecipital, central, frontal and temporal regions of the cortex. On the basis of analysis of the EEG recordings, the children were divided into three groups. The first group was composed of 11 children (27.5%) who showed EEG changes well within the normal range. The second group consisted of 9 children (22.5%)

whose EEG changes were borderline, i.e., deviations from the normal were minor, appearing on a background of alpha-rhythym preservation. Such minor variations could theoretically be a simple function of the age of the children tested; however, as will be noted, the authors felt that clinical examination suggested that this was unlikely. The third group consisted of 20 children (50 percent) with major deviations in EEG changes. In 4 subjects, the alpha-rhythym was poorly expressed, in 3 subjects, recordings from the central and frontal areas registered "spindle-shaped bursts of hypersynchronized beta and theta waves (page 13)," and in 13 subjects, an irregular, unsteady alpha-rhythym combined with bilateral and generalized bursts of slow oscillations in the form of delta waves was observed.

Clinical examination of the children in each of these three major groups indicated that the majority of children in the first group (normal EEG) showed no neurological signs, somewhat less marked behavioral pathology and a less severe anamnesis than children in groups 2 and 3. For children with borderline EEGs, retardation of intellectual development was more expressed. In 5 of the 9, soft neurological signs were discovered and in 4 of the 9, specific aggravating factors in their family history could be specified. The authors concluded that the more severe clinical and neurological symptoms together with an apparently more pathological anamnesis in the borderline children justified maintaining this as a separate category.

Of the 20 children with severely pathological changes in EEG, 14 showed minor neurological signs, a somewhat more marked retardation in development and an anamnesis which indicated some incidence of extreme pathology (e.g., retardation, mental illness, or alcoholism in the parents). In conclusion, the authors note that the existence between the first (normal EEG) and the third (most pathological EEG) groups of substantial differences in clinical and neurological symptomatology and anamnesis provides clear evidence for disturbance in the central nervous system in a significant portion of children with TRPD. Unfortunately, the authors do not note whether the clinical, neurological and anamnestic data and ratings of severity of symptomatology were obtained from the subjects by examiners blind with respect to the EEG results. If this is the case, the observed correlation between severity of EEG disturbance and severity of TRPD, although by no means perfect, is at least intriguing. It is worth noting, as well, that this finding would compare favorably with results obtained outside the USSR (Capute, Neidermeyer, and Richardson, 1968) using blind raters which indicated that among a group of children with diagnosed minimal cerebral dysfunction (defined in terms of the presence of soft neurological signs), 8 had relatively major and 43 mild to moderate EEG abnormalities.

Rheoencephalography (REG). Another technique which has been initially evaluated by Soviet electrophysiologists for its potential in differential diagnosis of TRPD is "rheoencephalographic measurement." The REG is a measure of the state of the circulation of blood in the brain. Opolinskii (1972) has argued that the simultaneous use of REG and EEG contributes to a more in-depth analysis of central nervous system pathology. In support of this position, he reviews data suggesting that the REG provides an indirect measurement of the functional state of the brain.

To assess the value of the technique for differential diagnosis in cases of TRPD, Opolinskii first evaluated the REGs and EEGs of 58 normal, healthy 8 to 10 year olds. REG measurements were taken so as to "reflect the state of the circulation of the blood in the reservoir of the internal carotid, which supplies a large part of the cortex, the sub cortex, and part of the brain stem (page 40). Of particular interest for the question of differential diagnostics was the fact that among normals, comparison of the REG pulse oscillations obtained from recordings in the right and left hemispheres indicated a significant asymmetry in the shape of the REG waves and their peaks; with a greater depression in wave peaks obtained from the dominant hemisphere. A comparison of this data with that of previous experiments with children suggests that REG asymmetry is characteristic only for children in the 8-13 year age range. In addition, both hyperventilation and the presentation of a stimulus led to marked, if different, changes in the shape and amplitude of the REG waves. Hyperventilation produced a lower amplitude REG and a decrease or disappearance of the asymmetry between the hemispheres, while the direction of REG change upon stimulus presentation was not predictable. It either increased or decreased as did the asymmetry noted above.

Next, a group of 40 children with diagnosed TRPD were examined in the same fashion. No significant quantitative differences in REG measures were found between these subjects and the normal children in the previous sample. However, among children with TRPD, there was an obvious decrease and often a complete disappearance of the asymmetry between the hemispheres in the shape of the REG waves. Thus, whereas the asymmetry was strongly expressed in 75.2% of the normals and completely absent in the rest (24.8%), among TRPD children, only 15.1% showed a strongly expressed asymmetry, while for 48.5% the asymmetry was weakly expressed and for 36.4%, it was completely absent. In addition, while stimulation induced either an increase or decrease in hemispheric asymmetry of REG peaks in normals, it elicited only an increase (or first appearance) of hemispheric asymmetry in a majority of TRPD children (72.7%) with the remainder showing no obvious reaction. Lastly,

35

in contrast to normals, TRPD children exhibited a marked stability in REG wave amplitude during hyperventilation.

Opolinskii interprets these differences as indicating "a disturbance in the tonicity of the vessels of the cortex of the brain, which is associated with pathological deviations in the functional brain state" (page 43). Finally, he also notes a certain lack of parallelism in the maturation of the EEG and REG which is not found in normal children; and he concludes by suggesting that pathological deviations in the electrical activity of the brain which are typical of children with retarded development are accompanied by changes in the circulation of the blood in the brain. Perhaps a further conclusion which might be drawn from this study is that the joint use of EEG and REG evaluation may be more helpful in diagnosing TRPD than either measure employed alone.

Examination of Higher Nervous Activity (HNA)

One manifestation of the general Soviet emphasis on psycho-neurological processes which follows directly from the Pavlovian tradition is the attempt (Luria, 1958; Lubovskii, 1972) to employ conditioning methods designed for the study of HNA in differential diagnosis. The techniques most commonly used for this task are derived from the "speech-reinforcement" method of Ivanov-Smolenskii (1960). In its standard form, this method is essentially structured like a classical conditioning paradigm, except that the speech of the experimenter replaces the presentation of an unconditioned stimulus (or "reinforcement"). Thus, for example, a subject might be seated in front of an apparatus with a two-color (green/red) light signal and a simple response mode such as a squeeze bulb. Whenever a red light flashes (acting as a positive conditioned stimulus), the experimenter might say, "Squeeze," eliciting a squeezing response from the subject; and whenever a green light flashes, the experimenter might say, "Don't squeeze!" When the subject begins to squeeze correctly, that is, only to the red light, without continuous speech reinforcement from the experimenter, then a stable, differentiated conditioned connection has been elaborated.

Multiple variations of this basic paradigm are possible; and a number of such variations are frequently employed for their diagnostic value. Thus, minor alterations in the conditioned stimulus may be included to assess the child's tendency to generalize his response. The signal values of the stimuli may be suddenly reversed (e.g., green becomes positive, red negative) and the subject required to learn the new contingencies. Irrelevant stimuli can be introduced to assess the degree to which they elicit an external inhibition or disinhibition of the learned connection (a measure of distractability). The tendency for the subject to perseverate in his response can be evaluated. This may be done either within trials (i.e., the subject may continue responding after the cessation of the stimulus light), or between trials (i.e., the subject may press to a negative stimulus preceded by a long series of positive stimuli), or even between experiments (i.e., the subject may suddenly begin to respond according to a previously learned simple connection in the midst of an experiment in which a complex differentiation is required).

Other alterations of the experimental conditions frequently employed in diagnosis are an increase in the frequency of stimulus presentation, an increase in the complexity of the required discrimination (e.g., squeeze after every green light preceded by two reds), and presentation of the stimuli in a fixed position stereotype (e.g., alternation) to assess the subject's ability to utilize the extra organization which this provides or, when a stereotyped order is suddently shifted to a random order, to overcome the effects of the stereotype and shift response appropriately. Alterations also include the use of preliminary instruction instead of direct speech reinforcement to pre-establish the conditioned connection, and assessment of the subject's ability to verbally state the rule governing his response after he has mastered a discrimination in a situation employing direct speech reinforcement.

Theoretical interpretation of HNA evaluation. In interpreting the data from such studies, Soviet psychologists generally talk in terms of four constructs taken from Pavlovian theory which describe the nervous processes: 1) strength; 2) equilibrium; 3) mobility; and 4) in man, interactions between signalling systems. Briefly, the nervous processes are viewed as consisting essentially of forms of excitation and inhibition. The strength of these processes is manifest in the speed with which new conditioned connections are elaborated and in the stability of the connections once they have been formed. When basic nervous processes are strong, new connections are quickly formed, well-differentiated (i.e., incorrect reactions are well inhibited), and highly resistant to the effects of distraction and fatigue.

Equilibrium refers to the balance which exists between excitatory and inhibitory processes. This too is reflected in differentiated responding. When excitatory and inhibitory processes are well-balanced, even repeated, rapid stimulation will not lead either to a generalized and impulsive responding to all stimuli (positive and negative) or to a generalized cessation of response to any stimulus.

Mobility refers to the ease with which a system of conditioned connections once formed can be transformed into another (as, for example, in the reversal of the signal meaning of stimuli). The opposite of mobility is inertness; and perseveration is seen by Soviet investigators as an index of the inertness or lack of mobility of nervous processes.

Lastly, man, according to Pavlov (1941), possesses two distinct but interacting systems of nervous processes (or "signal systems"). The first system is that which is built on direct stimulation from the physical world and a system of innate unconditioned connections. The second signal system is the socially derived system of language. The properties of the interactions between these two systems such as occur when a directly conditioned connection becomes available to verbal report or when connections between stimuli and motor responses are pre-established using a verbal instruction, are considered to be of particular importance in evaluating individual differences in HNA (Luria, 1957).

Discussion in English of some of the more important constructs in the theory of HNA and reviews of the numerous studies of individual differences in HNA which have been carried out in the USSR may be found in Luria (1957), Ivanov-Smolenskii (1960), Gray (1964) and Teplov and Nebylitsyn (1969). In addition, a detailed discussion of the specific characteristics of the HNA of children with various sub classifications of oligophrenia as well as an excellent example of the use of such techniques in diagnosis may be found in Pevzner (1961).

Differential Diagnosis of TRPD Using Techniques of HNA Evaluation. Despite the large quantity of Soviet research on HNA in general and on the developing forms of HNA in children and even in different classes of oligophrenic children in particular, relatively little research on the differential characteristics of the HNA of children with TRPD yet exists. Nonetheless, there are two series of investigations in this area which serve as the basis for at least the tentative use of HNA evaluation as a tool in differential diagnosis. The first such studies to be discussed are among the earliest investigations performed specifically with a sub classification of TRPD children. These are evaluations of the elaboration of simple differentiated connections in the first- and second-signal-systems and their interactions in 9 to 11-year-old cerebro-asthenic children carried out by Luria (1958) and his colleagues. The second series of investigations, performed more recently by Lubovskii (1972), were somewhat broader in scope and employed a wider range of children with TRPD. The main conclusions from each of these series of investigations will now be reviewed.

HNA and Cerebro-Asthenesis. Khomskaia (in Luria, 1958) presented 9 to 11-year-old cerebro-asthenic children with an apparatus similar to that described above and, using both speech reinforcement (i.e., accompanying every red signal with the word "squeeze" and every green signal with the words "don't squeeze") and pre instructional conditions (i.e., telling the child prior to stimulation, "when the red light flashes, squeeze; and when the green light flashes, don't squeeze") found that with light stimuli presented at moderate intervals, CA children of this age had no difficulty in achieving differentiated reactions. This was true for both conditions. However, if the signals were appreciably shortened or the rate of presentation was significantly increased, their performance quickly deteriorated.

In one sub group of CA subjects, reactions to rapidly presented signals became impulsive, so that a short negative signal closely following a positive signal began to elicit an incorrect positive reaction. This error was immediately recognized by most children, and exclamations of "uh, oh" and the like were common. Nonetheless, despite a recognition of error, inhibition of impulsive responding in this situation was impossible for these CA children. Similarly, if an irrelevant stimulus (a distractor) was presented with the negative light, or if a large number of negative stimuli were presented serially, or if the child was kept in the experimental situation for even a mildly extended period of time, incorrect impulsive responding to the negative stimulus also increased sharply (to as high as 50-60% of all negative signals).

An analysis of the latent periods of the reactions of these children suggested that with the repetition of positive signals, the latent period, rather than becoming stable, grew progressively shorter as the level of excitement in the child rose. This is interpreted by Khomskaia as indicating a progressive weakening of inhibitory processes which eventually leads to premature reactions to negative as well as to positive signals.

In a second sub group of CA children, reactions to rapidly presented signals changed in exactly the opposite direction from those of the first sub group. Increasing the difficulty of the task led to a total cessation of the child's response. First the requisite motor response to short positive signals began to be omitted and subsequently reactions to all signals ceased. In such children, latent periods began to lengthen prior to the complete cessation of responding. In discussing the differential reaction of these sub groups of children with CA, Luria (1958) intimates that the direction of performance in this task correlates to some extent with clinical manifestations of hyper- and hypo activity. Unfortunately, however, he cites no specific data to this effect.

A repetition of these same experimental conditions with a verbal instead of a motor response (e.g., saying "must" in response to a positive signal and "must not" in response to a negative signal) demonstrated that CA children were able to maintain clear and stable correct speech reactions even when the stimuli were of short duration and presented rapidly. This was equally true for both of the CA sub groups discussed above. Latent periods were similarly significantly more stable under speech response than under motor response. Luria (1958), in summarizing Khomskaia's results, notes that "these facts convincingly demonstrate that in these children the neuro-dynamics of the processes on which the speech system is based are significantly more intact than the neuro-dynamics of the processes underlying the motor reactions" (page 30).

In order to evaluate the dynamics of the interaction between the signal systems in CA children, the same experimental conditions were repeated once again, but the child's speech and motor reactions were effectively combined by asking him to respond to each signal by saying "must" or "must not" and by simultaneously squeezing or not squeezing the response bulb. This combined response mode led to a major increase in correct motor responding in children of both CA sub groups. Thus, impulsive responders decreased the number of impulsive reactions from the 50-60% obtained under a motor-only condition to only 10-15% with speech accompaniment; inhibited responders' omissions virtually disappeared; and, in both groups, latencies became stabilized. Lastly, a fourth repetition of the procedure in which the child was asked to return to silent response led once again to an increase in incorrect responding.

In another series of experiments by Khomskaia (Luria, 1958), CA children were presented with two series of stimuli which differed minimally from each other either along the dimension of brightness or of duration. In both cases, the differences in stimuli were so small as to approach threshold. These discriminations which are generally difficult for any population are apparently (Luria, 1958) especially difficult for CA children. Even when a differentiation seemed to have been elaborated,several successive presentations of the negative stimulus with no intervening occurrence of the positive stimulus for purposes of comparison would lead to incorrect responding. However, introducing a condition in which each child was told to name each stimulus led to a considerable improvement in performance, while a control procedure in which the child simply said "I see" to each stimulus did not.

A similar paradigm, utilizing a kinesthetic differentiation in which the child was told to respond to a red signal with a weak squeeze and a green signal with a strong squeeze elicited adequate performance under conditions of moderate stimulus length and duration. However, the shortening of the signals and an increase in rate of presentation produced a deterioration in differentiated response. Instead of switching rapidly from weak to strong response depending on the stimulus, the response of CA children tended to undergo a gradual transition over several trials from weak to strong squeezing in relative independence of the intervening stimuli. Again, however, requiring an appropriate verbal accompaniment led to an immediate improvement in the flexibility and differentiation of response. In general, therefore, it would appear that among CA children there is a strong tendency toward either impulsive or inhibited responding under conditions of difficult stimulus presentation. Luria interprets this as evidence for a disturbance in the equilibrium of nervous processes. In contrast, however, to this imbalance at the level of the first signal system is a relative equilibrium and stability of the speech system which makes it possible to use speech reactions to compensate for the instability of motor processes.

Although the pedagogical implications of Soviet research will be taken up in detail elsewhere in this paper, it may at this point still be worthwhile to note briefly that this research, which indicates the potential compensatory value of the speech reactions of learning disabled children, would seem to have major implications for the design of educational intervention. A number of investigators in the West have suggested similar possibilities (Meichenbaum and Goodman, 1971; Wozniak and Nuechterlein, 1973).

Lastly, it should also be pointed out that Luria and his colleagues, in other places (Luria, 1957, 1959), have suggested that while the initial elaboration of difficult differentiated reactions of this type presents the same general problem to MRs as to children with TRPD, the use of speech to facilitate such reactions in MRs is also difficult to achieve. This appears to offer the clinician an important differential diagnostic criterion.

HNA and the Broader TRPD Classification. Using the "speech reinforcement method" and elaborating a series of successively more complicated conditioned connections, Lubovskii (1972) has investigated HNA in school-age children with a full range of forms of TRPD. In general, he reports that a simple (positive only) conditioned reaction to speech reinforcement was elaborated in TRPD children at approximately the same rate as in normals, i.e., "the formation of a new conditioned connection occurred in almost all cases after only a single combination of the conditioned signal with the reinforcement"(page 11). In addition, as is also true with normal children, in many TRPD subjects the conditioned reaction was inhibited after its first appearance and was restored only after from two to ten repetitions of the signal and the speech reinforcement.

In contrast to the performance observed with normal students, however, in children with TRPD a marked variability existed in both the size and latent periods of the conditioned reactions. The presentation of extraneous stimuli (i.e., distractors) exerted a considerably stronger influence on the responses of TRPD subjects than on those of normals. Although Lubovskii fails to specify the exact nature of this influence, it may be assumed, in line with Pavlov's (1928) general characterization of external inhibition, that it would result in the child's omitting response to a positive stimulus. In addition, verbal report of the rule behind the simple conditioned connection was generally adequate for TRPD children, but was nonetheless reminiscent of reports given by younger preschool children in that the causal connections between the signal, the reinforcement, and the conditioned reactions were not always accurately reflected.

The initial presentation of new stimuli often elicited a broad immediate generalization of response in the TRPD subjects. This was true for some children even when the stimulation was presented in another modality from the original conditioned signal. Lubovskii notes that this wide generalization is also characteristic of oligophrenics. However, in contrast to MRs, the TRPD children in this sample ceased to manifest any generalization when, with repeated trials, a correct differentiation had been developed.

Simple differentiations were quickly formed in TRPD subjects, rarely requiring more than one or two trials. However, the stabilizing of these reactions proceeded very slowly, and in some children, this was never achieved. Lubovskii points out that despite the fact that TRPDs could quite adequately verbalize the rule of response, inhibition to the negative stimulus was repeatedly released and the children often responded impulsively. Furthermore, all of these children noticed their errors and usually did so immediately after the reaction. According to Lubovskii, this is another characteristic which distinguishes the child with TRPD from the mentally retarded.

Reversal of the signal meaning of the stimuli after differentiation occurred easily in children with TRPD after only a few trials. However, in distinct contrast to normals, TRPD children only rarely exhibited a systematic reversal of all connections, such that observation of the reversal of a single positive stimulus would induce an immediate reversal of the meaning of all other signals in the task without even a single trial with reinforcement for each signal.

As with MRs, children with TRPD found the stable establishment of relatively fine discriminations (e.g., two similar intensities of light) very difficult. However, as distinct from MRs, some TRPD children were capable of picking up the intensity difference on the first trial (i.e., orienting to it) and using it to establish a differential response as, Lubovskii asserts, typically occurs with normal children. However, unlike normals, TRPDs found it difficult to elaborate a stable response on this basis.

Another characteristic of the behavior of TRPD children in this situation which distinguished them from MRs was a high degree of spontaneous speech activity during analysis of the signals. It was often observed, for example, that during the early trials, children would begin to speculate about the rule governing the order of presentation of positive and negative stimuli (e.g., saying things like: "Two times press; one time don't press"). This type of active hypothesis generation was not, as a rule, observed among MRs. Furthermore, and Lubovskii suggests that this is the fundamental distinction between TRPD and MR groups on such tasks, in the TRPD children in this study, correct isolation of the distinctive feature to be responded to and *verbalization* of that feature generally preceded the appearance of a differentiated motor reaction. Only rarely was the reverse formation of a correct motor differentiation despite continued verbalization of an old incorrect rule observed, and these later instances generally occurred only when the distinctive feature was duration. This Lubovskii ascribes to the fact that TRPD children find discrimination of relative differences in duration extremely difficult since correct differentiation of duration requires an inhibition of immediate response to all stimuli. Only by waiting until the offset of a stimulus is it possible to judge its duration; hence, without an inhibition of immediate response to the stimulus, duration will be impossible to detect. Lubovskii argues that this type of initial inhibition of impulsive response is developmentally a rather late acquisition even in normal children and is weakest in children with both infantilism and asthenic conditions.

In summary, Lubovskii feels that while children with TRPD exhibit a number of characteristics of HNA pathology which are similar to those exhibited by the mentally retarded, they do so to a lesser degree; and they differ qualitatively from MRs in the extent to which the verbal system is active in the formation of conditioned connections. He also points out that these characteristics are the result of inadequate strength, poor concentration, and a marked inertia of the nervous processes--characteristics which are all also observed to some degree in younger normally developing children.

The Orienting Response, HNA, and Differential Diagnosis of TRPD. One last technique for diagnosing individual and group differences in HNA to be mentioned only in passing, since published reports of its use extend only to MRs and not to TRPD children, has been described in some detail by Luria (1961), based on work by Sokolov and Vinogradova. Luria points out that "there can be at least three different reasons why the child can fail in school and why he cannot acquire the knowledge the teacher wants to bring to his mind. The child may be unable to learn because he does not hear or perceive what the teacher is giving him. In a different case, the child cannot acquire the knowledge, not because he does not hear. He does hear, but he does not listen; he is not actively attentive enough to all that is given to him. [Or, third] the child hears and even listens but he does not understand the material given him; he is unable to generalize or systematize it"(page 8). In order to differentiate failures in hearing from those due to attentional and/or comprehensional deficits, Luria suggests the use of techniques for measuring the orienting response (Sokolov, 1963).

Briefly, the orienting response (OR) is a generalized, non modality specific sensitization of the receptor apparatus which occurs to sudden changes in stimulus energy. Depression of the alpha-rhythym in EEG recordings, galvanic skin conductance changes, and vaso-constriction in the finger tips are typically employed as indices of the occurrence of an OR. A subject placed in a quiet room with earphones on will give evidence of an OR to any sudden above-threshold sound which is delivered through the earphones. In this way, obviously, the OR technique can be employed for audiometric evaluation without recourse to verbal response. In addition, however, it is one of the most important characteristics of the OR that with repeated presentation of a stimulus (e.g., a tone), changes in EEG, galvanic skin conductance and finger blood volume will habituate, i.e., the OR will gradually decrease in amplitude until it ceases to occur. Over repeated trials, in other words, the subject will cease to attend to the tone. On the other hand, this does not occur in normal subjects if the tone is given a signal meaning. If, for example, the subject is told something like "count every tone you hear," then a stable OR, which does not habituate is elicited. The tone has become meaningful and the subject's attention to it is stabilized. Furthermore, if, while the subject is actively listening for tones to count, a strong sound is delivered from a source external to the earphones, it will not produce an OR. Presumably the normal subject is engrossed in listening for the tones presented through the earphones and pays no attention to the outside noise.

Use of this technique with severely mentally retarded children demonstrates exactly the reverse effect. Even when the child is instructed to count tones, the OR habituates in a very few trials and a strong outside noise produces an intensive reaction. Luria concludes that this technique has obvious potential value as a measure of children's differential distractability.

Lastly, Luria points out that comprehension in the form of semantic generalization can also be studied employing this same general approach. For example, designating only one among a set of words (e.g., "cat") as a signal stimulus stabilizes the OR to that word but allows it to habituate to others. Words which are either semantically very similar (e.g., "kitten") or phonetically very similar ("cap") can then be inserted experimentally into the word list at random intervals. Luria reports that, in general, normal school age children show evidence of semantic but not phonetic generalization of the OR while their severely mentally retarded age-mates are more inclined to generalize along phonetic lines. Although this technique may have been utilized in the USSR with TRPD children, the results of such investigations, if they exist, are not readily available.

Psychological and Psycho-Educational Evaluation

In evaluating a child for retention in a regular school program or for assignment to an auxiliary school for the mentally retarded, Soviet psychologists employ, along with anamnestic, physical, neurological, electrophysiological, and HNA data, the results of the child's performance in a wide-ranging series of psychological tasks and data from detailed observations of the child's behavior, failures, and successes in the classroom. The content of most of these tasks, both psychological and psycho-educational, is traditional, and, as Brozek (1972) has pointed out, it does not vary greatly from that which is encompassed by most of the standardized psychometric instruments employed in the West. The form of such tasks, on the other hand, is perhaps uniquely characteristic of Soviet psychological and psycho-educational work. First, both the administration of the tasks and the evaluation of the outcome is essentially clinical and diagnostic rather than standardized and psychometric. The examiner, in the absence of published normative data, must rely on his own clinical experience and, where available, published descriptions of the qualitative characteristics of the task performance of various diagnostic groups in evaluating the performance of an individual. Second, and particularly in cases in which TRPD must be discriminated from various forms of mental retardation, administration of diagnostic tasks may occur in a multi-step process in which the child is first asked to perform independently, then provided with a graded series of organizing assists from the examiner, and then again asked to perform independently. Evaluation of the child's performance in this multi-step process takes into account not only the characteristics of his initial approach to the task, but also his ability to profit from adult assistance and to transfer any improvement to subsequent independent performance.

The sources of this unusual format for psychological and psycho-educational assessment may be found in two characteristics of Soviet psychology which have already been alluded to: 1) a heavy emphasis on intellectual processes as socially developed functions and a particular reliance on Vygotsky's notion of varying "zones of potential development"; and 2) rejection of standardized, psychometric testing on philosophical as well as scientific grounds. Each of these will now be discussed in some detail followed by a summary review of the primary psychological and psycho-educational tasks employed in differential diagnosis.

Social Organization, Intelligence, and the "Zone of Potential Development." From the dialectical philosophical perspective which underlies Soviet science (Wozniak, 1975), higher-order human psychological processes such as complex perception, voluntary memory and attention, and logical thought do not represent innate forms of intelligence. Rather, they are viewed as gradually structured during the course of the child's development through active encounter with a social and physical world. Initially, intelligent action is entirely external, involving the physical manipulation of objects [illegible] overt social interactions. Gradually, however, in the course of development, these actions become detached from the specific social and physical contexts in which they have been formed, abstracted and generalized with the participation of the language system, and internalized as the basis of higher-level mental process.

Social interaction, in the Soviet view, plays a critical role in both the formation of complex actions and the process through which these actions are internalized. Thus Vygotsky (cited in Luria, 1958) asserted that such "complex processes are *formed in the course of the child's development* and that they are accounted for by the *methods and means of organization of activity* which arise and are adopted by the child in the course of its manipulations with real objects and in its intercourse with adults"(page 39).

A corollary to this point of view is that the child's development begins in his earliest interactions with his parents and older siblings and continues through the work of his teachers and other adults in society. Thus, although the very young child is initially incapable of successfully accomplishing many tasks by himself, in instances in which he encounters difficulty, the adults and older siblings who surround him will often intervene and provide him with the methods necessary to succeed in the task. It is a cornerstone of Soviet developmental theory that what the child is initially able to do only with such help, he eventually comes to be able to do independently *by virtue of* incorporating into his own action and eventually internalizing the organizational principles inherent in the assistance which he receives from others. As Luria (1961) quotes Vygotsky: "The function which is today divided between two persons will be interiorized and become the independent mental function of the child himself"(page 6).

Luria (1961), in discussing this principle of the social origins of cognitive development, applies it to the question of psychological assessment, and it is in this context that the meaning of Vygotsky's notion of the "zone of potential development" may be most clearly seen. Thus, Luria asks: "When we know that the higher psychological processes, including intellectual activity, have this complex developmental history and are formed in the course of the child's speech-based social relationships, can we continue to adhere to the former static principles in assessing a child's abilities and intellect? Can we continue to make confident judgments of a child's intellectual development merely on whether he performs a given task on his own with greater or lesser success"(pages 40-41). In answer to his own question, Luria suggests that given the principles of social development a more appropriate method of psychological evaluation might involve a comparison of the child's initial independent performance with that of which he is capable using direct adult assistance and then, particularly, with that of which he is capable after adult intervention in subsequent independent performance. This suggestion is similar to one made originally by Vygotsky which he referred to as "the investigation of the child's zone of potential development"(Luria, 1961, page 41). This "zone" is essentially the range of potential development characteristic of a particular child and manifested in his ability to profit from adult-provided organizational cues.

The concept of "zone of potential development" has received broad currency within the Soviet Union and particularly so with respect to the question of differentiating children with TRPD from MRs for the purposes of program assignment. As will be discussed in more detail in the next section on experimental psychological research, it is the general Soviet view that a critical criterion for the differentiation of TRPD from MR is the width of the child's zone of potential development. Although initial levels of performance on many tasks may be similar for children with TRPD and for MRs, it is felt, on the basis of both clinical and research experience, that TRPD children will be able to take more immediate advantage of systematic adult-provided organizational cues relevant to task solution. In addition, because of their potential for an ultimate level of development well within the normal range, TRPD children should also be better able to profit from adult-provided cues in subsequent independent performance. In this way, an evaluation of a child's "zone of potential development" can be an extremely important tool for proper diagnostic classification.

Soviet Rejection of Standardized Psychometric Testing. The historical background to the rejection of standardized testing in the Soviet Union includes a complex series of political, economic, and scientific events occurring in the late twenties and early thirties which culminated in the promulgation in 1936 of a decree by the Central Committee of the Communist Party (the Decree Against Pedology) which outlawed "testology" (cf., Wortis, 1950, for a discussion of this decree). Clearly an analysis of these events is far beyond the scope of this article. However, a brief discussion of contemporary objections to standardized psychometrics may possibly help to clarify the reasons behind the heavy emphasis in the USSR on clinical diagnostic procedures.

First, it is not, as occasionally thought, that Soviet psychologists are opposed to all evaluation of intellectual performance. As this article has attempted to show, the structure of the Soviet system of special schooling requires such evaluation. It is rather standardized, overly quantified, single-administration IQ tests to which Soviet scientists direct their heaviest criticism.

Some of this criticism, particularly that directed at an over reliance on quantification (e.g., the computation of an IQ), derives from political and philosophical principles in Marxist thought. Thus, it is often stated (cf., Zeigarnik, 1965, for one such statement) that the attempt to "measure" or quantify intelligence is based on the false principle that mental capacity is somehow a fixed quantity and innate and that such development that occurs is merely linear, quantitative and largely predictable from earlier measurements. From the dialectical Soviet Marxist perspective, as noted in the previous section on "zone of potential development," nothing could be farther from the truth. Quantitative methods, they argue, miss the whole point of the potential for further development which always exists in human intellectual functioning. Instead such methods estimate only the quantity of already acquired knowledge and (here the argument takes on political overtones) "children of the higher strata of capitalist society, having been brought up in favorable conditions and having received a better education, reveal a wider range of knowledge in these tests and are thereby enrolled in schools with a higher educational standard than children of the less wealthy strata of society"(Zeigarnik, 1965, page 42). In the Soviet view, in other words, psychometric tests are designed so as to perpetuate the class structure in capitalist society.

Second, the objections which Soviet psychologists raise against psychometrics are by no means only political and philosphical but are often based on more purely scientific considerations. The qualitative aspects of poor performance, they point out, are often ignored in standardized psychometric testing. This is particularly true with respect to variables such as the child's work methods, strategies of problem solution, and attitudes toward the tester and the test. Furthermore, because of the highly rigid, standardized nature of the presentation, the child is given little opportunity to employ his strengths to compensate for his areas of weakness, something which he may do every day to achieve perfectly adequate adaptation to conditions in his home and classroom. In addition, the rigors of standardized presentation virtually exclude the possibility of obtaining critical information about possible compensatory mechanisms which might be employed in organizing training materials for the child's education.

The typical single administration of psychometric instruments and the careful attempts in test construction to minimize "contaminating" adult interactions are, of course, also the subject of Soviet scientific criticism. From the point of view of the concept of the "zone of potential development," a single evaluation of the child's independent performance is precisely the approach most likely to lead to a deformation in the evaluation of the child's intellectual abilities. Worst of all, as Zeigarnik (1965) has pointed out, the more pathological the subject's intellectual development (and often therefore the more important it is that the assessment be accurate) the more likely single administration, independent psychometric testing will lead to a stereotyped and inaccurate evaluation.

Psychological and Psycho-Educational Tasks. The tasks to be described in the following paragraphs are in general clinical use in Soviet psychology and psychiatry (Pevzner, 1961; Zeigarnik, 1965) and two clinical studies (Dem'ianov, 1971; Reidiboim, 1972) suggest that they are also being actively employed in the diagnosis of TRPD. However, as will be apparent from the review presented in the next section, most of the recent experimental research dedicated to the systematic analysis of the differential psychological performance of children with TRPD has employed variants of these tasks. With few exceptions, the authors of these investigations cite a lack of information on that differential performance as the justification for their research. This, in turn, suggests that in the absence of experimental evidence on the variations in the behavior of MRs, TRPDs, and normals on these tasks, evaluation must still be based largely on the examiner's own clinical experience.

The tasks employed in psychological evaluation fall roughly into five categories: 1) general knowledge; 2) visual analysis; 3) spatial organization; 4) phonemic hearing; and 5) cognitive functioning. Clearly, these groupings are somewhat arbitrary, and there is a great deal of overlap in the degree to which a specific task taps abilities within different categories. The category headings chosen, however, generally reflect both the functional approach taken by Soviet psychologists and reporting conventions often seen in the Soviet clinical literature (cf., Pevzner, 1961, for a similar breakdown in case history data).

Each of the major psychological and psycho-pedagogical assessment tasks will now be described. Where clinical data on the differential performance of TRPD children exists, this will also be reported here. However, data from experiments employing the same or comparable tasks will be reviewed in the next section. Furthermore, tasks for which experimental data exists will be described only briefly here since they will be taken up again in that section.

General Knowledge. Questions about everyday facts, such as where and with whom the child lives, what his father and mother do for a living, what the names are for the days of the week, months, or seasons, are employed (Pevzner, 1961) to assess the child's general orientation to his surroundings. Experimental research (Shevchenko, 1974) on the level of general knowledge in TRPD children will be reviewed in the next section. Typically, however, it would appear that the TRPD child does not possess as broad and deep a knowledge of his environment as does the normal child.

Visual Analysis. The general format for evaluating the child's visual analytic abilities is to present him with a line drawing or picture and ask him to describe it. Zeigarnik (1965) has pointed out that "this apparently simple task may be of great value in revealing whether the subject perceives the material in generalized form or whether he dwells only on unessential details--whether he immediately describes the general meaning or becomes fixated upon the parts" (page 59). The complexity of this task can vary from simple pictorial object recognition (Pevzner, 1961) to recognition of objects presented with reduced visual cues (continuous or broken line drawings, pictures oriented upside down, etc.) to the description of more complicated visual arrays (e.g., the branch of a cherry tree). In the latter case, the zone of potential development can be explored by providing children whose initial analytic performance was inadequate with sub pictures containing minimally distinctive pairs varying on features critical for accurate analysis and description of the main picture followed by a reevaluation of independent performance. Experimental research (Egorova, 1969) involving this procedure will be reviewed in the next section.

Spatial Organization. To assess spatial organizational ability, the child is asked simple questions about his own bodily orientation in space and its relation to the bodily orientation of others, his concept of left and right is evaluated, and he is asked to construct figures from sticks or matches following visual-spatial models which vary from the simple to the complex. On some trials it may be possible to copy the model directly while in others a spatial transformation may be required. In addition, the model may be removed and a 5-10 second delay inserted between the viewing of the model and the initiation of construction. An experimental investigation (Zharenkova, 1972) of the TRPD child's ability to copy models will be reviewed in the next section. Clinical data reported by Dem'ianov (1971) and Reidiboim (1972) suggests, however, that TRPD children have particular difficulty with problems involving spatial organization. Of 32 8 to 11-year-olds examined by Dem'ianov, 11 showed poor orientation even with respect to the sides of their own body and confusion concerning the "right" and "left" of the examiner. Similarly, in constructing stick figures, 90° or 180° transformations produced distortions in the form of the construction, and stick figure constructions were particularly difficult when completed after a 5-10 second delay.

Phonemic Hearing. The evaluation of auditory perception appears (Pevzner, 1961) to be limited primarily to tests of phonemic discrimination and reproduction and of the general comprehension of spoken speech. These apparently are then evaluated clinically by the examiner, since no normative data or experimental research with TRPD children seems to be available.

Cognitive Function. A number of complex cognitive variables are tapped by the remaining psychological tasks. These variables include the comprehension of higher-order relations (comprehension of stories with a theme and of metaphor, construction of a story using pictures which can be arranged in sequence), classification, the recognition of oddity, memory, and the structure of associations. The basics of most of these tasks are described in Zeigarnik (1965), and both Pevzner (1961) and Zeigarnik (1965) give detailed examples of their use with populations other than TRPD. In the diagnosis of TRPD, however, these tasks are often modified to make them more appropriate for the exploration of the "zone of potential development." Some of these modifications will be noted below and in the next section on experimental research.

Comprehension of higher order relations is evaluated by presenting the child with extended prose material, complex pictures, or pictorial sequences and asking him a variety of questions about the presentation. Thus, for example (Pevzner, 1961), the child might be read the following story: "As soon as Serezha wakes, he begins to look for his things. One stocking is on the chair, the other under the table, one boot is under the bed, and the other is not in the room at all. Serezha wastes his time every morning and he is late for school"(page 70)." The child might then be asked how Serezha could be sure to be on time for school and questions of a similar nature designed to assess whether or not the child comprehends the causal relations between Serezha's clothes not being properly arranged, the time which must be wasted in looking for them, and Serezha's being late for school.

In addition to stories, the child may be read common, simple proverbs and metaphors, asked to explain them or to think of some example from everyday life to which they apply. In certain instances, the method of story comprehension and the method of proverbs overlap, as in an experimental study (Tsypina, 1974) to be reviewed in the next section in which a metaphor was incorporated in a rather long and complex story as an aid to comprehension. Although this study suggested that young TRPD children (unlike normals) are unable to make adequate use of metaphor to facilitate comprehension of a story theme, Dem'ianov (1971) in his clinical investigation of 8 to 11-year-old TRPDs found adequate comprehension of allegories. Unfortunately, Dem'ianov's material is not presented in sufficient detail to allow a comparison between the two investigations with respect to the relative difficulty of the tasks involved.

Comprehension of the temporal relations which exist in a sequence of events is also assessed using pictures. In some instances, the pictures employed are serial (e.g., as in Zeigarnik, 1965, in which the child is shown a series of 5 pictures representing successive stages of the breaking and repair of a cartwheel), and the child is asked to arrange them in their proper order and then tell their story. In other cases, the picture employed may be a single complex "picture with a plot." Thus, the child might be presented with a picture of a flock of doves sitting on the roof of a shed, a cat crawling up to the roof after the doves, a boy carrying a ladder attempting to set it against the shed so that he can climb up and shoo away the cat to save the doves, and a flock of goats coming out of the doorway of the shed and hindering the boy from setting the ladder against the side of the shed. The child may then be asked to explain the events depicted in the picture. If the child has difficulty in initial independent performance, his zone of potential development may be tapped by providing him with sub pictures which isolate the relevant elements and binary causal relations (e.g., cat-doves; boy-doves; goats-boy),asking him to discuss these pictures, and then reassessing his integration of the total theme of the "plot" in subsequent independent performance. An experimental investigation (Tsymbaliuk, 1973) employing this technique with TRPD children will be reviewed in the next section.

Straight classification ability is typically evaluated (Zeigarnik, 1965) by presenting the child with a series of objects or pictures of objects and asking him to arrange them into different groups on the basis of common general characteristics. The child is free to arrange the items in any way he chooses, and his arrangements are evaluated primarily in terms of whether or not they show evidence of having been established on the basis of general signs common to the various objects or only on the basis of elementary (e.g., perceptual) similarities or contiguity in experience. In this later case, groupings tend to be chain-like (A is grouped with B for one reason, B with C for another, etc.) rather than homogeneous (Vygotsky, 1962).

Zeigarnik (1965) notes that this test"provides a means of determining the level of the process of generalization; [and that] we may learn whether the subject forms groups only on the basis of the special, concrete associations or whether he does so also at the level of wider generalizations and whether he is guided by this level throughout the experiment"(page 49). No experimental investigations of the specific characteristics of the classification ability of children with TRPD have apparently been reported. However, Dem'ianov (1971), in his clinical study suggests that 8 to 11-year-old TRPD children do well at classification tasks. Such a finding would be in line with the typical Soviet characterization of children with learning disabilities as having a generally adequate level of logico-conceptual development.

Another method commonly in use, like classification, to assess the child's ability to "generalize" is an oddity task referred to by Zeigarnik (1965) as the "method of exceptions." This task involves presenting the subject with cards on which four items have been drawn. Three of the four objects are interrelated via some common conceptual attribute while the fourth is "odd." The subject is asked to pick out the object which doesn't fit and to justify his choice. Adapted to explore the "zone of potential development," this task might include dropping down to a three picture presentation with two highly similar items and a third very distinct item tapping the same conceptual attributes as the original four picture task. In addition, a series of prompts to assist the child to solve the simple task may also be included. Reassessment of subsequent independent four item performance would then follow. Although neither clinical nor experimental data on TRPD performance in this task appear to have been published, the American specialists who recently visited Soviet defectologists (see footnote 4 on page 9) have reported observing the use of this technique together with the usual Soviet report that children who can take advantage of simplification of the procedure to improve subsequent independent performance should be classed as TRPD, whereas children who cannot are likely to be mentally retarded.

✓ Memory is evaluated using two variations on a methodological theme which can be traced at least as far back in Soviet psychology as early work by Luria (1928) and Vygotsky (1929) and which is still currently being explored (Smirnov, 1973; Meacham, 1972). This is the notion that memory and particularly voluntary memory may be investigated through an observation of the subject's use of various types of mnemonic devices. The two variations of this method which are usually employed in clinical diagnosis are described in some detail by Zeigarnik (1965). Briefly, in one variant, the "method of pictograms," attributed by Zeigarnik to Luria, the subject is asked to remember a number of words. In order to assist him in remembering, he is told to think of something that will help him in recalling the words and to draw it on a sheet of paper. Letters and words are, of course, not allowed as mnemonics in this task. In a second variant, called the "method of indirect memorization" and attributed to Leont'ev, instead of drawing as a memory aid, the subject simply chooses one from among a set of 30 pictures given him for that purpose by the experimenter. In both tasks the subject, after choosing his mnemonics, is asked to recall as many words as he can and to explain the associations which he formed between remembered words and any mnemonics which he employed.

An obvious extension of the method of pictograms which might be employed to explore the zone of potential development would involve a simple unaided memory task, followed by a task including instruction to utilize mediational devices of the type described above, followed by reassessment of the child's independent memory performance without such instruction in order to assess whether or not mnemonics (e.g., drawing) would be spontaneously employed in subsequent independent performance. Although experimental research (Egorova, 1972) on the memory abilities of TRPD children will be reviewed in the next section, the paradigm employed there does not involve use of mnemonic aids. Apparently, there is as yet little information in the Soviet literature on the ability of TRPD children either to profit from the use of mnemonics under instruction or to use them spontaneously after instruction.

Lastly, the structure of the child's associations is assessed using several variations of the traditional association task. These variations are described in some detail in English by Zeigarnik (1965). For this reason and also because these methods are quite traditional and because there is apparently no published clinical or experimental research on association tasks given to children with TRPD, it is sufficient simply to note here that such tasks are a commonly employed component of the general Soviet psychological diagnostic procedure.

Psycho-educational assessment, in contrast to the psychological diagnostic process just described, does not generally consist of the presentation of specific tasks, but rather of the long-term careful observation of the child's behavior, work habits, errors, and successes in the classroom and particularly in situations involving the basic school skills (reading, writing, and arithmetic) and social interaction. The flavor of this approach may be gained from the summary information provided by Pevzner (1961) in reporting case history data on a number of mentally retarded schoolchildren. In addition, Pekelis (1971) and Nikashina (1972) have published long, detailed reports of psycho-pedagogical observation and intervention with children with TRPD. Lastly, information on the psycho-pedagogical problems of TRPD children has also been contributed by a number of quasi-experimental studies (Triger, 1972; Ippolitova, 1972,1974; and Tsypina, 1972) which have investigated the problems of TRPD children in writing, arithmetic, and reading respectively. These studies will be reviewed in the next section on experimental research and the Pekelis (1971) and Nikashina (1972) observations will be discussed in the final section on educational programming. Little more, therefore, need be said here about psycho-educational assessment and TRPD, except to note once again that this, along with all of the other forms of evaluation previously discussed, constitutes an essential source of information to be used by Soviet psychologists in decisions concerning the placement of a child in a special school or special program.

Experimental Psychological Studies of Children with TRPD

With only a few exceptions, such as the early work of Luria (1958) and his colleagues on higher nervous activity in cerebro-asthenics, experimental research in the USSR on the psychological characteristics of children with TRPD is of relatively recent origin. Thus, of the studies to be reviewed in this section, only one was published prior to 1972. For this reason, and also because the number of research workers in this field is apparently still somewhat limited, the quantity of experimental Soviet research on TRPD is rather small. Nonetheless, this research is quite varied, covering aspects of visual analysis, spatial organization and planning, attention, memory and general cognitive functioning. Each of these areas will now be reviewed in turn.

Visual Analysis

In clinical and pedagogical descriptions of children with TRPD, the remark is often made that the child's utilization of visual material is inadequate. Clearly a pressing task for any psychclogy which hopes to provide information for effective curriculum design for such children is the specification of the locus of this inadequacy. In which of the multiple processes which must be rapidly and efficiently brought to bear in the extraction of information from a visual array, in other words, might TRPD children experience a reduction in processing capacity? A number of such processes have received the attention of Soviet psychologists. Those which are more properly termed "perceptual" will be discussed here. At the most basic level of visual analysis, the capacity for a quick search of the visual field, the grouping of elements in that field, and the integration of the data from multiple groups is assumed to be of paramount importance in the pick-up of higher-order visual information. One possible explanation for the relatively poor ability of TRPD children to profit from visual materials, therefore, might be an underdevelopment in the search and grouping processes.

This hypothesis was evaluated by Shoshin (1972) in an experiment in which 19 TRPD, 23 MR, and 20 normal children aged 9-11 years, and 10 normal adults were given a simple number recognition task in which they were shown visual stimuli consisting of from 1 to 6 identical dark round dots on a light background and asked to specify the number presented. The integers from 1 to 6 were chosen for recognition because both the concepts and the responses (i.e., the numbers "1"..."6") required for performance have been thoroughly overlearned even by 9-year-old MRs and Shoshin wished to minimize the possibility that observed differences in performance might be due to variation in cognitive functioning. In addition, to rule out any effect of attentional and counting speed variations and to guarantee that differences in performance would reflect perceptual processes, the stimuli were presented tachistoscopically in a procedure designed to assess the shortest exposure interval required for the maintenance of a fixed arbitrary level of correct recognition. Thus the presentation interval for each stimulus was initially sufficiently long to guarantee correct recognition, then gradually reduced until the point of zero recognition was determined, and finally again increased until the child achieved the standard recognition level. This point is referred to as the "temporary threshold of recognition."

Furthermore, in order to evaluate the efficiency of the child's search and grouping processes, two types of configurations of dots were employed. A symmetric configuration similar to that observed on dominoes and for which the impact of differences in search and grouping might be expected to be small (because the pattern can be processed holistically) provided baseline recognition threshold data. An asymmetric configuration in which the dots were randomly distributed across the visual field was assumed to require maximum efficiency of search and grouping. Consequently, the ratio of temporary threshold for asymmetric to symmetric configurations was able to be employed as a measure of the relative efficiency of search and grouping processes.

The results of this study indicated that with symmetric configurations, no significant differences in temporary threshold of recognition existed among the three groups of children (presumably adult thresholds, which are not specifically reported, were lower) although a slight rise in threshold was noted for both MRs and TRPDs relative to normals on the 5- and 6-element figures. For asymmetric configurations, the thresholds for TRPD children were uniformly higher than those for normals; the thresholds for MRs were uniformly higher than those for TRPDs, although these differences were statistically significant only for the 5- and 6-element displays. This difference between performance on symmetric and asymmetric configurations can perhaps be most clearly seen from a comparison of the mean ratio (asymmetric to symmetric threshold) scores obtained by each group as a function of the number of dots in the field. Thus, for example, for configurations with up to three dots in the field (requiring relatively little search and grouping), normal adults and children found the asymmetric configurations relatively little harder than symmetric configurations (average ratios of 1.2 and 1.3 respectively for the 3-dot array). Children with TRPD, on the other hand, required relatively more time for correct recognition of asymmetric versus symmetric arrays than did normals (average ratio of 1.7 for the 3-dot array); while MRs had the most serious relative difficulty with the asymmetric configuration (average ratio 2.4).

Of greatest potential interest, however, for evaluation of the hypothesis that it is search and grouping at which TRPD and MR children are poorest are the results from the 5- and 6-dot figures, since it is with these that the necessity for search and grouping is maximized. Reviewing the data from the 6-dot array for purposes of example suggests that MRs find the asymmetric array much more difficult to search and group efficiently, requiring 6.3 times as much time for the temporary threshold of recognition as they do with symmetric 6-dot arrays. TRPD children also find this task considerably more difficult when the configuration is asymmetric than when it is symmetric (average ratio of 2.6). Normal children and adults, although beginning to reach the point at which a symmetric configuration is essential for rapid processing of numerical information, still perform at a reasonably high level on the asymmetric configurations (ratios of 1.7 and 1.4 respectively).

The author interprets this data as indicating that there is a relative automatization of search and grouping strategies in the normal child by age 9-11 such that very little more time is required for the pick-up and integration of simple discrete information scattered across the visual field than for the holistic processing of more highly organized material. Children with TRPD and particularly MRs, on the other hand, do not appear to have developed the same high level of efficiency in this basic visual processing skill. Shoshin suggests that this implies that in the classroom such children should be allowed a longer period of time to become familiar with visual aids, that important information to be conveyed to the child should not be presented in isolated elements of the field or in small detail but should be integrated into a single attention-getting image.

In addition to basic perceptual processes like search and grouping, a number of higher-order visual analytic abilities are assumed to be of great importance in the child's differential adaptation to varying visual experience. Specifically, in order to obtain the maximum benefit from visual materials, a child must be capable of perceiving the similarities and differences which exist among items in the visual field. Often important information in a picture (or in the world) is carried by rather subtle, graded differences along a number of dimensions such as color, shape, number, orientation, spatial configuration, etc. The child who is most perceptive at picking up these differences will be in a position to profit most from visual presentations. Since TRPD children do not seem to utilize visual materials to their greatest advantage, it might be hypothesized that relative to normals their ability to notice the distinguishing features of objects, i.e., to analyze the visual display in detail (even when given the necessary time) is underdeveloped.

This hypothesis was explored by Egorova (1969) in an experiment which, in line with the concept of zone of potential development, also evaluated the relative effects of distinctive feature training on the performance of children in various diagnostic categories. To begin, Egorova presented her subjects, 20 normally achieving, 30 learning disabled, and 20 mentally retarded 2nd- and 4th-grade children, with a color drawing of a cherry tree branch. Each child was instructed to look the picture over as carefully as possible and to describe it in detail, telling the experimenter what had been drawn, how many things he saw, what was their shape, color, arrangement, and so forth. The number of features (defined in terms of parts and properties of the main drawing) discriminated by the child was employed as a measure of the child's visual analytic ability. In addition, responses were classified in terms of type (i.e., shape, color, arrangement of parts, etc.). On the average, normally achieving subjects discriminated 12.5 features in comparison to TRPD and MR groups which named only 6.5 and 4.5 respectively. Differences among all groups were statistically significant. In addition, the range and distribution of performance of the children in the three groups is of interest. This is presented in the top half of Table 1.

Insert Table 1 about here

As can be seen, the performance of all TRPD children fell in the middle range of scores, with no TRPD subject in either the highest or lowest categories. No normal child scored in either of the two lowest categories and no MR child scored in the highest category. Note also that the modal performance for both TRPD and MR subjects fell in the same category: average-low.

Egorova, in discussing the results from this initial assessment, notes that on the basis of a combination of qualitative and quantitative factors in performance, three sub categories of responder could be distinguished among TRPDs. The 27 % who fell in the average-high category virtually all exhibited a great deal of impulsiveness, disorganization, and haste in responding. "Without listening to all of the instructions," she reports "some of them nodded their heads indicating that they understood and hurriedly began to tell their story. A request by the experimenter to listen to the instructions to the end was received by the majority of children with evident displeasure and simply went in one ear and out the other. In naming the features, they did not hold to any certain plan, they characterized the object first one way and then another. For example, one 4th grader said: 'Here are three cherries. There's a brown branch. There's a leaf like a saw. It has this kind (indicating) of edge. The cherries are very red. And a bent twig. The leaf is very green.'" (page 31).

Among the 73 % of TRPDs who fell in the average-low group, two sub categories could be noted. Some children responded like those described above, only more poorly, while the majority were not impulsive, but rather responded to the instructions with statements that they couldn't do it, and only began the task after additional instruction.

In the second level of the experiment, children in all three groups were presented with a "teaching album" in which pairs of pictures differing on only a single feature (e.g., number, shape, configuration, etc.) were arranged so that each child saw only those pictures relevant to features which he had not discriminated during initial independent performance. The child was asked to look at each pair of pictures and name the difference. If the child had difficulty noticing or naming the feature, the experimenter assisted him with a series of prompts.

At the conclusion of level two training, the original picture was presented once again with instructions and procedure identical to the initial presentation. The mean number of features discriminated by each of the three groups after training was 18.1 (normals), 10.5 (TRPD), and 5.7 (MRs). Egorova draws particular attention to the fact that although normal children profited most from adult assistance (an increase of 5.6 features on the average), children with TRPD also benefited substantially (an increase of 4.0 features on the average), almost achieving the initial level of performance reached independently by normal students, while MRs benefited only minimally (an increase of only 1.1 feature on the average). Furthermore, a glance at the distribution of post training description scores presented in the bottom half of Table 1 suggests that for normals and TRPDs, training produced a distinct upward shift of the distribution, with the vast majority of normal and some TRPD children now scoring in the highest category and with the highest percentage of TRPD subjects now in the average-high category. MRs, on the other hand, despite minor improvement, were all distributed after training in the bottom two categories.

Egorova interprets these findings as support for the notion that TRPDs may be distinguished from MRs far more easily by their ability to take advantage of adult organizational assistance than by the level of their initial performance. She concludes with a comment to the effect that the critical pedagogical characteristic of TRPD children is their inability to perform well in independent work and their concomitant capacity for improved performance with structured adult assistance. The results of this study suggest that teachers need to provide such assistance to the learning disabled child in helping him to develop the ability to make visual analyses, to perceive similarities and differences along important dimensions. In addition, Egorova also notes from her observations of the qualitative characteristics of the response of TRPD subjects that teachers need as well to pay attention to helping the child learn to perform the task of visual analysis and describe the results of that analysis *systematically*, according to some plan. Although Egorova does not specifically point it out, her qualitative observations strongly suggest that lack of systematicity in scanning a visual array both in terms of a spatial exhaustiveness (i.e., covering all portions of the array according to some organized approach such as left-to-right, top-to-bottom scan) and conceptual structuring (i.e., beginning with the most global features and proceeding in an orderly way to the description of detail) may well rank with insensitivity to distinctive features as sources of poor utilization of visual material in children with learning disabilities.

Spatial Organization

In addition to efficient analysis of the visual input, the adequate utilization of visual material also often requires that the child structure his response to reflect the information which exists in the visual array. To do so, the child must use the elements of the array as a model in constructing a plan for his own action. It is certainly possible that the TRPD child suffers from an underdevelopment of the ability to use visually acquired information to construct a behavioral plan or even from a relative inability to follow such a plan should it be provided for him.

To a certain extent, these hypotheses can be evaluated by providing the child with visual and verbal models and asking him to follow these models in the drawing and construction of objects in space. Zharenkova (1972) presented a series of such tasks to 20 TRPD, 20 normal and 10 mentally retarded first and second graders. In the first set of tasks, the subject was shown visual models which contained all of the features essential for accurate performance. The models employed in this series consisted of a nonsense figure made of different colored triangles, circles, and squares, a colored geometric mosaic of a man, an outline of a diamond shape, and a simple printed text. For tasks involving the first two models, the child was presented with the appropriate materials and asked to construct figures which corresponded to the models. For the last two tasks, the child was given a pencil and asked to draw (write) a copy of the model. In addition, after copying each model, the child was asked to evaluate his work.

The primary result of interest was the extreme impulsiveness manifested by TRPD students in these tasks. The most typical feature of TRPD performance in contrast to that of both other groups was the display of a combination of many and varied corrected and uncorrected errors. This effect was particularly evident in text-copying where TRPDs made seven times as many corrected and ten times as many uncorrected errors as normal students. In addition, this impulsiveness was also manifest in the construction tasks in a much greater incidence of trial and error behavior (i.e., picking up an incorrect component, trying it, seeing that it doesn't match, rejecting it, picking up another, etc.) among TRPDs than among children in other groups.

TRPD children were, in general, also rather inaccurate and impulsive in evaluating their own work, often responding to evaluation questions without even comparing their construction to the model. In addition, in the diamond copying task, which the child performed three times, with evaluation of his work after each trial, TRPD children generally performed more poorly over trials, paying less and less attention to the model even when their own evaluation of their previous work had been negative. Zharenkova interprets this as evidence that TRPD children are impulsive, have a low level of self-control, are unable to evaluate their work correctly, and exhibit a lack of goal orientation.

In a second set of tasks, the child was presented with two situations which employed visual models which did not contain all of the information necessary to successful performance. The additional information was incorporated in auxiliary verbal instructions given by the experimenter. The first task of this series was identical to the first task of the initial series, consisting of the use of different colored triangles, circles, and squares to copy a model figure, except that the model presented to the child was in black and white and the experimenter verbally added the instruction that all of the elements used in constructing the figure must be of a different color. The second task required the child to copy the same text as in the first series except that he was told, in addition, to underline the letter "t" (which appeared 12 times in the text) whenever he found it.

In general, TRPD subjects found the first task to be considerably more difficult than its initial series counterpart. The added processing required to monitor the colors already used and exclude them from future selection without the direct visual structure provided by a colored model led to a significant increase in TRPD subjects' impulsive actions during selection, and in the number of both their corrected and uncorrected errors. Of interest also is the fact that while children with TRPD made relatively more impulsive actions than corrected errors and relatively more corrected than uncorrected errors, MRs performing the same task made primarily uncorrected errors, with the number of impulsive actions and corrected errors following in that order.

In contrast to the first task, TRPD performance on the second task was higher than that for its initial series counterpart, with the majority of TRPD children making fewer mistakes of all types. Although Zharenkova suggests that the results in this second task are a function of the increased attention to the model required by the underlining condition, it should be noted that an appropriate control for practice was apparently not included. In fact, the same criticism (though with respect to boredom and/or fatigue) might be leveled at the design of the first task. This design problem unfortunately makes the interpretation of these results somewhat ambiguous.

In the last set of tasks to be presented to the child, a purely verbal variant of the colored geometric form construction task and a verbally directed complex drawing task were presented to each subject. In the first task, the child was again asked to construct a figure out of colored circles, triangles, and squares, but the order of their distribution was given only through verbal instruction. In addition, the subject was again told that each of the elements employed in the construction had to be of a different color.

In the second task, the child was asked to construct a design by drawing lines to connect squares and triangles which had been arranged with small circles between them.

The child was also told that he must construct the design in such a way that: 1) squares and triangles were joined only through a small circle; 2) lines were always drawn from left to right; and 3) lines had to be drawn so as to be continuous. Because the task was complex, the child was initially shown a model and allowed to carry out several examples with the continuous cueing of the experimenter in order to learn the rules. The child was then presented with a verbally described design which he was asked to draw independently (i.e., with only the verbal directions of the examiner to guide him).

Results indicated that carrying out the geometric construction task according to the verbal instruction alone presented approximately the same level of difficulty as carrying out the task with a black and white visual model. Once again, TRPD children made a large number of impulsive actions and corrected errors. In most cases, corrections were caused by the child's attending initially to only one of the task requirements (e.g., shape) and then going back and changing elements where needed to make the design conform to the other task requirement (e.g., variation of color). Normal students had no serious difficulty with this task, and MRs found it very difficult and particularly more difficult than carrying out the analagous task with a black and white visual model.

In the design construction task, children with TRPD had their most serious problems during the example phase, i.e., in learning the rule system to be followed, finding it very difficult to take all of the parameters of response into account at the same time. However, a majority of the children in this group who finally succeeded in mastering the rules were able to use them in subsequent independent performance.

Although this is not specifically discussed by the author, there are a number of alternative explanations for the TRPD child's relative inability to make efficient use of a visual model in organizing his response. First, as suggested by Shoshin (1972) and Egorova (1969) in the studies previously reviewed, the TRPD child may be somewhat poorer than the normal child at analyzing the visual model and noting the distinctive features critical for differential response. Clearly such an analytic ability is a prerequisite for adequate modeling, and, as such, would affect performance in these tasks. This interpretation is, in fact, at least partially supported by the presence of large numbers of uncorrected errors in TRPD performance.

On the other hand, the existence of equally large numbers of impulsive actions and corrected errors on the part of TRPD subjects even when the visual model was replaced by a verbal model suggests that the inadequacy of TRPD performance cannot be wholly ascribed to incomplete visual analysis. To the contrary, the large number of corrected errors in which the child altered his response as a function of feedback from a comparison of his partially completed construction with features of the model would seem to provide evidence for a considerable competence in visual analysis.

Another possible explanation of the TRPD child's difficulty with use of visual models is suggested by the investigations (Luria, 1958; Lubovskii, 1972) of the higher nervous activity of TRPD children previously discussed. From this research, it is apparent that inability to inhibit immediate response to stimulation is a marked characteristic of many children with TRPD. Clearly, an initial temporary inhibition of response to the model is as much a prerequisite for adequate modeling, particularly in instances in which more than one dimension of the model (e.g., shape and color) constrain response, as is visual analysis. The viability of this interpretation is supported by the finding of a large number of impulsive actions and corrected errors in TRPD performance. From these results, it would seem clear that the TRPD child may often fail in achieving the inhibition of immediate response to the model necessary for him to complete an appropriately exhaustive visual analysis before initiating his response.

Lastly, a third alternative also seems plausible. Even if a child is capable of successfully inhibiting his immediate response to a model long enough to complete an exhaustive visual analysis and is in possession of the processing techniques necessary for such an analysis, it is still entirely possible that a breakdown could occur in the process by which visuo-spatial information (e.g.,the configuration of elements in a mosaic of a man) is converted into an appropriate serially ordered spatiotemporal plan for the active construction of the figure (e.g., the shoulder must be joined to the body before the arm is attached, etc.). Unfortunately, the design of Zharenkova's study does not provide sufficient information to assess the relative contribution of this factor as opposed to that of general impulsiveness to the behavior of TRPD subjects in following a visual or visual-verbal model. However, research (Tsimbaliuk, 1973) to be reported shortly, suggests that visual-spatial to spatiotemporal transformations of this type may be particularly difficult for some TRPD children.

Divided Attention

Another characteristic of the behavior of the TRPD child commonly mentioned in clinical and psycho-pedagogical observations is his relative distractibility. This is, of course, a particularly serious problem for education since the capacity to focus attention voluntarily on educational tasks even in the presence of background events of high salience (e.g., conversations, classroom noise, etc.) is an essential condition for the assimilation of task relevant information and hence of learning. A study by Peresleni (1972) was designed to provide documentary evidence for the differential distractability of TRPD children and to evaluate its potential value as a criterion for the diagnosis and discrimination of TRPD from mental retardation. Three groups of subjects, 15 TRPDs, 16 normals, and 12 MRs, all of whom were 8-9 years of age, were chosen for the study. Vibrators which produced vibro-tactile signals of an amplitude and duration reliably above threshold, were attached to each wrist of the subject and the subject was instructed to press a key whenever he felt a vibration. In addition he was told to press the key as quickly as possible without error and in making the response to use the finger of the hand which felt the vibration. Lastly, the subjects were also required to follow these instructions while simultaneously listening through headphones either to noise, to music, or to a story called "Masha and the Bear." In each of the three tests, a series of at least 50 signals were presented in random order to the right and left hands with the single constraint that each hand receive an equal number of signals.

Latency of response, omissions, and commission errors were all recorded. Approximate mean latencies, quadratic deviations, and total error scores (ommissions plus commissions) for children in each of the three groups for each of the three experimental conditions are presented in Table 2. From this

---

Insert Table 2 about here

---

table, it can easily be seen that latencies for normal subjects were uniformly shorter than those for either TRPDs or MRs. Furthermore, while latencies for normals rose only slightly from the least (noise) to the most (story) distracting condition, TRPD latencies rose more sharply (particularly for the story condition) and MR latencies showed the steepest rise. All of the differences between conditions for TRPDs and MRs were significant.

Employing the quadratic deviation as a measure of variability of speed of reaction, it may be seen from Table 2 that variability is greater for TRPDs than for normals and greater for MRs than for TRPDs. In addition, when response must be produced while the child is listening to a story, latencies for TRPD and MR subjects but not for normals become much more highly variable. This result is generally paralleled by the pattern of error scores which, as can also be seen in Table 2, only reached noticeable levels for TRPD and MR subjects in the story condition. However, it is important to note that even here TRPD error rates remained very low.

Another measure of interest is the degree of stability of reaction time over the course of the fifty stimulus presentations. An indication of this stability can be gained for each group by a comparison of the mean latency to the first ten stimuli with the mean latency to the last ten stimuli. While none of the groups showed any pronounced retardation in latency over trials when listening either to noise or to music, all groups slowed somewhat in the story condition. For normals the average change was 61 msecs., for MRs 112 msecs., and for TRPDs, who registered the greatest change, latency increased by 120 msecs.

In viewing the pattern of results from this experiment as a whole, a number of conclusions might be drawn. First, only background stimulation in the form of a story appears to have a generally negative effect on the performance of all children. This effect is much more marked for children with TRPD and for MRs than for normals. Peresleni points out that this differential distraction cannot be explained by a lower level of interest in the story manifested by normal subjects, since, on the contrary, the normal students appeared to be more interested in the story than TRPDs and MRs. Thus, for example, when the experiment ended before the story was completed, normal students asked much more frequently to hear the story to its conclusion than did TRPDs or MRs. Apparently, therefore, meaningful background stimulation is a powerful distractor, and a more powerful distractor for learning disabled and mentally retarded children than for normals.

Second, although in terms of both the mean and variability of latencies TRPDs performed more like MRs than like normals, TRPDs were still able, even during the story, to maintain an almost normal accuracy of response to vibratory signals and a far higher level of accuracy than MRs. If one makes the common assumption with Peresleni that the size of the latent period of a choice reaction is a neurodynamic index which reflects the speed of processing sensory information in the central nervous system, then it would appear that TRPDs give up a certain speed of processing in order to maintain accuracy under conditions of high distraction (story). However, it is clear that this is by no means the only implication which might be drawn from latency data. Rather, TRPDs and MRs also both register considerably longer latencies to reaction than do normals even in the condition in which only simple noise is played into the earphones. Since it is likely that subjects would quickly habituate to noise and that such noise would also serve to mask other potentially distracting sounds, one would, if anything, consider this task to provide reasonably optimal conditions for attention to the vibro-tactile signals. The relatively slow reaction times of MRs and TRPDs even in this situation, therefore, suggests that a noticeably slower rate of sensory information processing may be a general characteristic of their performance.

Lastly, a requirement for continuous vigilance appears to some extent for all subjects and most obviously for children with TRPD to result in a decrement in performance over time. The author attributes this decrement to fatigue. However, it is possible that a story which has a plot line which gradually builds in interest value might tend to be more highly distracting at the end than at the beginning. Unfortunately, Peresleni's design does not allow these two possibilities to be distinguished.

Taken together, the results of this study have important implications for a characterization of the learning disabilities of the child with TRPD. When simple, discrete, and reasonably well spaced stimuli are presented to the child for processing, TRPD subjects are able to maintain a high degree of accuracy even under rather distracting conditions, but only by virtue of slowing an already relatively slow processing rate. It seems obvious from this that in situations such as the classroom, where the child becomes the target of information which is presented serially at high rates requiring continuous coding and storage, the TRPD child is likely to be at a serious disadvantage.

Cognitive Functioning

In its most general meaning, the term "cognitive functioning" refers to the acquisition and use of knowledge. What knowledge does a child have? How did he come to acquire that knowledge, and how does he use the knowledge which he has to guide his actions? Given this broad definition, it is easy to see that questions of perception are to some extent inseparable from questions of cognitive function. Knowledge about the world comes to the child through his senses. The better organized his perceptual processing capacities, the more efficient will be his information pick-up and the greater the breadth and depth of his knowledge. This is not, however, a unidirectional effect, but rather an interaction. It is equally true that the more knowledge a child has gained about the world, the better organized will be his perceptual processing and the more efficient his information pick-up since the child can use the knowledge to structure his perceptual activity. Thus, for example, the child who comes to "know" that the orthographic expression of his language is a code which proceeds from left to right will be much more efficient at picking up the information which exists in the orthography; that is, his knowledge will guide and systematize his visual analysis. On the other hand, the realization that left-to-right progression is an important variable of orthography, i.e., "knowledge" about the relevance of this spatial dimension to the task of reading, may be inaccessible to the child until his visual analytic techniques have developed a sufficient degree of systematicity to allow him to pick up enough ordered information about the orthographic code that he can notice its left-right progression. Although Soviet psychologists may not phrase the problem in exactly this way, it is nonetheless their confirmed point of view that knowledge, perception, and action exist in a mutual, continuously interacting system, jointly determining the child's level of adaptation to the world.

Given this perspective, the deficiencies in basic perceptual skills such as search and grouping, in visual analytic techniques, and in general information processing capacity in children with TRPD suggested by the research just reviewed might be expected to be both a source of underdevelopment of basic knowledge about the world in TRPD children and a reflection of that same poor development. This hypothesis, viz., that TRPD children are characterized by a relatively low level of knowledge about the world, has been evaluated in several Soviet investigations.

Shevchenko (1974) conducted a series of semi-structured individual discussions with 20 7-year-old TRPD and normal children. The topics chosen for these discussions involved the surrounding world, natural phenomena, and the child's own personality. Among other things, many children with TRPD were found to have relatively incomplete and imprecise conceptions of parental occupation. Although they might know the location or general enterprise at which their parents worked, their knowledge about the duties associated with parental professions was often poorly developed. Furthermore, a warning by the experimenter at the end of the initial discussion of parental occupation that he would talk to the children about this topic again seemed to have little effect on children with TRPD. While almost half of the small group of normals who did not give precise and complete answers to these questions initially obtained this information from their parents in the interim and performed at a high level in subsequent discussion, few TRPD children did so.

Reasonably parallel findings are also reported by Shevchenko regarding the TRPD child's knowledge of the Russian patronymic system. Despite its ubiquitous use in address, first grade TRPD children, in contrast to normals, have not yet come to realize the relationship between the patronymic and the father's first name. Furthermore, although TRPD children could, with training, come to comprehend formation of the patronymic, they did so only with relative difficulty suggesting that they did not initially possess the concept.

Shevchenko interprets these findings as support for the notion that TRPD children are characterized by a relatively poor development of certain "everyday" concepts. However, in line with results reported for the next experiment to be discussed, it should be mentioned that an alternative explanation is possible, particularly with respect to the TRPD child's poorly expressed knowledge of parental occupations. In assessing this knowledge, Shevchenko employed a discussion technique which does not readily allow one to distinguish between absence of a concept and difficulty in voluntary recall of information. As we shall see, this later process may also be one which presents particular problems to children with TRPD.

Assuming that comprehension of visual and aurally presented materials occurs on the basis of the concepts which the child has available for processing incoming information, then studies of comprehension provide an indirect indication of the level of the child's knowledge. Two of the most interesting Soviet experiments with TRPD children are of this type.

The first, a study by Tsypina (1974), in addition to measuring comprehension, also directly acsessed the level of the child's knowledge of relevant information. Eleven 1st-grade normal, TRPD, and 2nd-grade MR students were chosen to participate in the experiment. The procedure consisted of a combination of storytelling and discussion periods arranged in the following order: 1) Initially the child was engaged in a semi-structured discussion of dandelions. During the discussion, the child was asked to tell the experimenter everything he could about dandelions. The number of distinct features which the child mentioned during the discussion served as a dependent variable. 2) Next the child was asked to listen to a story read to him by the experimenter. The story, called "The Golden Meadow," centers around a dandelion meadow which changes color every morning and evening as the dandelions open and close. Comprehension of the main theme of the story requires that the child appreciate the causal-temporal relations between time of day, the opening and closing of the dandelions, and the change in color of the meadow. In order to facilitate comprehension of the causal effect on the meadow of the opening and closing of the dandelions, the author of the story compares the dandelion to a hand which can open to reveal fingers or close into a tightly rolled fist. 3) When the story was completed, the child was asked to retell it in his own words. 4) Following the retelling of the story, the child was engaged in a second semi-structured discussion in which the following questions were asked: What happened to the meadow? Why did the meadow change color? What does it say in the story about a hand? 5) Finally, the child was once again asked, "What do you know about dandelions?"

Results from the initial semi-structured discussion demonstrated that while TRPD subjects knew something about dandelions (naming from 1-3 characteristics) and more than was known by MRs (who named only 1-2 characteristics and those only after prompting), they were not able to mention as many characteristic features of dandelions as were normal students (5-6). This appears to reinforce the suggestion by Shevchenko that the level of knowledge of TRPDs is somewhat underdeveloped; however, as we shall see shortly, such a conclusion may be premature. In addition, and of particular importance for the interpretation of the remainder of the experiment, no child in any of the three groups was initially aware that the dandelion opens and closes at different times of the day.

Performance in the immediate recall of the story (i.e., retelling) was analyzed by dividing the story into five main sections and scoring for inclusion of each section during retelling. In addition, two of the five sections, which contained the information about the relations between time of day, the opening and closing of dandelions, and change of color of the meadow were considered to be most essential to the sense of the story. Upon retelling, these were tallied separately. In general, TRPD subjects performed about as well as normals in recalling the distinct subsections of the story. Although there was somewhat higher variability among TRPD than among normal students, most reproduced the text quite fully and included the two essential sections (as did normal students). MRs, on the other hand, reproduced the story incompletely, out of order, and usually without the two central sections.

In order to clarify whether the high level of obtained recall reflected a concomitantly high level of story comprehension by TRPD children, the answers given to the questions in part four of the procedure (after retelling) were analyzed. Of the 11 TRPD subjects, only 5 gave evidence of understanding what caused the meadow to change color, and even they appeared to be somewhat confused, talking about the meadow opening and closing instead of the opening and closing of the dandelions in the meadow. The remainder of the TRPD group disregarded the story entirely in attempting to answer this question, suggesting to the experimenter that perhaps the meadow turns yellow in the daytime from the heat, etc. In contrast, all but one of the normal students were able to explain the cause of the phenomenon (despite the fact that none of them knew initially that dandelions open and close); and none of the MRs could do so successfully. In addition, all of the normal subjects, only 9 TRPDs and only 4 MRs were able to indicate that they understood the relationship between the meadow changing color and time of the day.

In the text of the story, as mentioned earlier, the author employs a clear metaphorical comparison between the opening and closing of the dandelions in the morning and evening and the opening and closing of a hand which is able to spread out its fingers or curl them into a fist in order to help the child grasp the idea of the dandelions changing, an idea which is essential to the comprehension of the theme as a whole. The great majority (9 of 11) of TRPD children did not comprehend this comparison or even notice it. This was true of MRs as well, while over half of the normal subjects understood and were able to explain this literary device.

The clear implication of these findings is that the ability exhibited by TRPD children to recall and accurately retell a story which has been told to them is not necessarily indicative of a high level of comprehension. On the contrary, recall appears to be accomplished formally, in a relatively rote fashion. This would suggest that new information, though accessible for "retelling," might not necessarily be available for generalized transfer to a new task. The data from part 5 of the procedure in which the children were again asked what they knew about the dandelion is particularly interesting in this regard.

When asked a second time to describe dandelions, most subjects began with a repetition of the characteristics which they had listed in the pre-story discussion. However, while MRs simply stopped after repeating their earlier statements, normals went on to name 1-2 more features of the dandelion than they had named previously and TRPDs added from 3-5 new characteristics to their descriptions. In fact, the performance of TRPD children at this point approximated in quality the descriptions obtained from normal students during the initial pre-story discussion. Surprisingly, though, the new features which TRPD subjects named were not drawn from the text since they were not included in the text. Furthermore, not a single TRPD or MR subject was able to incorporate the one new feature of the dandelion which was included in the text (viz., that it opens and closes in the morning and evening) into his description. Nine out of 11 normal students, on the other hand, did mention this newly discovered characteristic, and it accounted for most of the increase in their description scores.

Tsypina interprets these findings, first of all, as indicating a relatively low level of voluntary recall ability on the part of children with TRPD. Apparently these children were initially unable to "think of" all of the characteristics of dandelions which they knew. Only with the provision of a large number of retrieval cues through the story and discussion were they able to demonstrate their true level of knowledge about dandelions. This indicates in turn that data such as that from the previously discussed study by Shevchenko (1974) which suggests a low level of concept development among TRPD subjects must be interpreted with caution, since it will often be difficult to distinguish between a lack of knowledge on the part of children with TRPD and a relative inability to voluntarily recall that which is known.

Secondly, from the fact that only normal subjects and not TRPDs were able to incorporate the newly obtained piece of information about dandelions opening and closing into their post-story descriptions, despite both groups having routinely included it in retelling the story, Tsypina concludes that memory for the story among TRPDs must have been based largely on a formal rote repetition rather than on comprehension of the theme and that comprehension must be essential for the generalized transfer of information. This conclusion is further supported by the observation that among normal subjects, the 9 (of 11) children who incorporated the new information about dandelions into their descriptions were the same 9 children who demonstrated clear comprehension of the causal relations in the text.

A second investigation of comprehension in children with TRPD was conducted by Tsimbaliuk (1973). The goal of his research was to evaluate the relative capacities of TRPD and normal students for comprehending the higher-order relationships which exist in a complex visual array, which in this instance was a picture with a plot. In order to provide the opportunity for maximum differentiation of TRPD subjects, Tsimbaliuk adopted the general format of the "zone of potential development" study.

A group of 30 8 to 9-year-old TRPD and a comparable group of 7 to 8-year-old normal subjects were shown the following picture: A flock of doves is sitting scattered across the roof of a shed. A cat is creeping up on the doves unnoticed. A boy is putting up a ladder intending to drive away the cat and goats are coming out of the shed, hindering the boy and threatening to knock over the ladder. The subjects were told to look at the picture as carefully as possible, to tell the experimenter what is happening in the picture and how it is happening and also to think of a title for the picture.

In order to characterize the child's level of understanding, explanations of the pictured events were rated according to a system based jointly on the number of cause and effect relationships noted in the picture (a maximum of 3 is possible: cat-doves; boy-cat; goat-boy) and on qualitative attributes of the explanation (e.g., sequential connections, tendency to merely list objects, etc.). Employing this system, children's stories were distributed into four categories: I. Attempts to explain the story but with no apparent comprehension of the plot. Not a single causal relation is mentioned, and generally the movements of the animal, pose of the boy, etc. are only vaguely understood. II. Attempts to explain the story with no real comprehension of the plot. One cause and effect relation may be mentioned; but the child generally only lists objects and actions. III. Explanations of the story which achieve some success, but with a partial or one-sided comprehension of the meaning of the cause-effect relations. Two cause and effect relations are usually indicated, but the sequence of events is typically poorly elucidated. IV. Adequate explanations of the plot. All three cause-effect relations are noted and integrated into a single unified theme.

Explanations given by TRPD and normal subjects were distributed as follows: For TRPDs, 3 were assigned to category I, 14 to category II, 8 to category III and only 5 to category IV. The mean category score for the entire group was 2.5. For normal students, on the other hand, none of the explanations were assigned to category I, only 6 to category II, 10 to category III and 14 to category IV. The mean category score for normals was 3.3, differing significantly from that obtained by children with TRPD. Although there is a sizeable overlap in the performance distributions of the two groups, it is clear that on the whole normal students were better able than TRPDs to integrate the information in the visual array to produce a coherent account of the plot.

The second stage of the procedure was composed of a training session in which children who had given incomplete explanations (levels I-III) on the initial task were shown a set of additional pictures depicting sub-stories of the main plot. These pictures were shown to the child in three sequential stages, with the assistance of the experimenter progressing from a bare minimum to direct demonstration. The first set of training pictures presented the characters in the main picture (doves on the roof, cat creeping in front of the shed, goats coming out of a corner of the door, etc.); but each character was portrayed separately, with no unifying plot. The child was told to look the pictures over in sequence and to describe them. This minimum level of training was included on the theory that for some children poor performance on the original task might have been a simple function of poor visual analysis. The child might have neglected to notice one or another of the components of the picture and thus have failed to comprehend the plot as a whole. When the child had looked the pictures over, he was told that he now knew more about how everything happened in the main picture and that he should try to tell the story again. If the child still did not reach category IV in his explanation, a second intermediate level of training was employed.

Intermediate training presented children with pictures, each of which isolated a single cause-event relation (e.g., goats coming out of the shed and rushing at the ladder, the cat approaching the doves, etc.) The child was shown only those pictures appropriate to the cause-effect relations which he had previously ommitted in his explanations. This was followed by another opportunity for the child to explain the plot of the main picture. Any child whose explanation still did not reach the level of category IV was provided with a third and final training session. In this training, a set of 5 sub-pictures which clearly depicted the serial order of the events in the main picture was shown to the child; and the child was told to describe the events thus portrayed. When this description task was completed, the child was once again shown the main picture and asked to explain the plot.

The results of training and retesting suggested that minimal training (provision of simple pictures of isolated characters) was effective primarily for children in the normal group. Following this procedure, none of the normal students remained at level II and four had successfully crossed from level III to level IV. Among children with TRPD, however, this level of training affected only a total of 4 students, two who crossed from II to IV and two who crossed from III to IV. Tsimbaliuk notes that it is of particular interest that the 3 TRPD students who were at level I on initial presentation (implying an inability not only to name the cause-effect relations but even to describe the characters with precision) stayed at this level after minimal training. This was true despite the fact that these children were able with the immediate assistance of the experimenter to achieve a high level of accurate description during training.

Intermediate training (provision of pictures which isolated binary cause-effect relations) assisted all of the remaining normal subjects to achieve a type IV categorization. Among TRPD subjects, however, with a sole exception, only those children who were already at level III managed to achieve adequate category IV explanations after the intermediate training routine. The remaining children with TRPD (and only TRPD subjects) all required the final, most explicit training experience in order to produce level IV explanations, and even after this final training there were still a few TRPD children who were unable to provide a complete and correct explanation of the plot. Tsimbaliuk notes that it was typical of these children (i.e., those who never achieved a high level of comprehension) that their explanations remained virtually identical from one repetition to another. Apparently they were unable to incorporate the information imparted to them during training into the inflexible routine which they had established with respect to explanation of the plot.

In discussing the total pattern of results from this study, the author suggests that among children with TRPD (just as between children with TRPD and MRs), there exists a wide range of individual differences in the width of the zone of potential development. Thus, for example, although the measure of initial performance failed to differentiate among the 14 TRPD subjects whose explanations fell into category II, the results of the training tasks suggested that some of these children were capable of rapid progress when provided with the additional structured assistance involved in training, whereas others improved their performance only slowly or hardly at all.

An additional advantage of the training experiment which is only touched upon briefly by Tsymbaliuk but which bears special mention is that the systematic provision of ordered assistance to the child in tasks such as this one can provide extremely valuable information to the experimenter about the locus of any performance deficit which the child manifests. Thus, for example, the existence of cases of immediate transition from category II or even III to adequate category IV explanations following only the elementary additional assistance provided in initial training suggests that for some children (primarily normals), the original failure to produce a complete integration of plot elements was due simply to inadequate visual analysis. Forcing the child to attend to the details of the action of each of the plot characters produced an immediate integration of the total theme of the picture.

On the other hand, the fact that some normal and many TRPD subjects were unable to achieve a level of complete comprehension after minimal training suggests that poor visual analysis alone could not have been responsible for their poor performance. Taken together with the improvement in explanation of the plot effected in all of the remaining normal and many of the TRPD subjects by intermediate training, this would seem to indicate that in processing a complex picture (with a high rate of simultaneous information input and many distracting features) some children may have difficulty in identifying the specific causal relations which exist between paired characters. Although both characters which enter into a cause-effect relation are perceived, they are apparently perceived independently. Intermediate training which isolates and consequently forces attention to the binary relations which constitute the plot elements may then have assisted children to perceive the characters in interdependence and to integrate them into single cause-effect pairs (e.g., the cat will eat the doves, the goats will knock over the boy's ladder, etc.).

Lastly, the failure of some TRPD children to produce category IV explanations even after intermediate training suggests that still another source of difficulty must have hindered their performance. Since this task essentially poses the problem of integrating visual material for verbal description, adequate performance requires the transformation of simultaneous information into a plan for sequential verbal output. The TRPD child may find such transformations extremely difficult. Although he sees the three separate binary cause-effect relations which constitute the plot elements, he may not know how to go about ordering them in time so as to integrate them into a single temporal theme. This hypothesis is supported by the finding that some of the TRPD subjects still unable to achieve an adequate explanation of the plot after intermediate training were able to take advantage of the sequence pictures provided during the final training routine to produce a category IV explanation. Presumably they needed to see the temporal sequence portrayed visually in order to comprehend the temporal plot relations. This suggestion also seems to be in line with the results of the previously discussed study by Zharenkova (1972) in which TRPD subjects were found to have difficulty with the visual-spatial to temporal-sequential transformations required for accurately following a visual model in the construction of a design.

Memory

Once information has been taken in by an organism and utilized for on-the-spot adaptation to the surrounding environment, it must be coded and stored in a form which makes it easily accessible for utilization in the future. Information which does not remain accessible is at least functionally lost to the organism, and the quality of future adaptation suffers accordingly. Data from two of the studies of TRPD children so far discussed (Shevchenko 1974; Tsypina, 1974) indicates at least indirectly that TRPD children may suffer from a lowered ability to voluntarily access information which they are known to have stored. This hypothesis has also been put to a direct test by Egorove (1972).

Eighteen 1st-grade and 22 2nd-grade TRPD subjects and 20 normal 2nd- and 3rd-graders (all children were aged 9-10) were presented with an immediate recall task in which they were briefly shown a collection of 20 pictures of highly familiar objects and then asked to recall as many of the objects as they could in any order. The set of 20 pictures was shown 5 times with recall assessed following each presentation. In addition, following the fifth trial with this set of pictures, the entire procedure was repeated a second time with an alternate set of 20 pictures. Thus each child was given 10 recall trials in all, 5 with the first set of 20 pictures and 5 with the second set.

As anticipated by Egorova, the overall level of recall for normal students (mean = 14.5 items/trial) was somewhat higher than that for TRPDs (mean=11.9 items/trial). In addition, a number of qualitative differences in the memory performance of students in the two groups were observed. For example, although all subjects (while picking up new items) to some extent lost items over the five trials which they had recalled correctly after trial 1, this tendency was considerably more marked in TRPDs than in normal children. Thus by trial 5 the ratio of newly recalled to repeated items had only declined to 32.7% for TRPD subjects (as compared to 16% for normal students), indicating a substantial rate of turnover in their recall. New items, in other words, continued to constitute almost 1/3 of the items recalled by TRPD subjects even after trial 5.

Furthermore, although the recall performance of TRPD and normal subjects differed only slightly after trial 1 (8.8 and 9.7 items respectively), by trial 5 this difference had become more marked (13.8 vs. 17.4 respectively). In part this reflected the fact that while maximum individual performance was achieved by almost all of the normal students after trial 5, only 50% of TRPDs peaked at this point. After trial 4, 32.5% reached their highest recall levels and 17.5% reached this peak after trials 2 or 3. The high percentage of new items in the recall of TRPD children after trial 5, therefore, cannot be simply accounted for by a large relative increase in total recall on that trial made up by the inclusion of a large number of new items. On the contrary, for many TRPD subjects total recall after trial 5 was somewhat lower than on previous trials Apparently this was because old items--items recalled on those previous trials--had been lost.

Some insight into the source of the recall problems of TRPD children may be gained from the observation by Egorova that overall stability of memory performance, as measured by a comparison of average recall levels for the first set of 20 pictures with those for the second set of pictures, appears to decline much more frequently for TRPDs than for normals (37.5% vs. 10% and to improve much more frequently for normals than for TRPDs (35% vs. 12.5%). Furthermore, these changes are mirrored by changes in the frequency with which the grouping of recalled material is observed in the two samples. While normal students grouped about 40%

of their recalled material after trial 5 of the first set of pictures in contrast to TRPDs who grouped only 20, this percentage rose to 57.5% for normal subject following the last trial of the second set of pictures and declined to 10 for TRPDs. Since the rate of grouping may be taken as a rough measure of the efficiency of a subject's storage and retrieval techniques (Smirnov, 1973), this seems to imply that the decreased memory performance of TRPD subjects over time may be more a function of poorly developed storage and retrieval processes rather than of the decay and absolute loss of the information which has been stored. In conjunction with the finding of Tsypina (1974) that TRPD children knew more about dandelions than they were able to recall voluntarily (i.e., without the experimental provision of experiences which could function as retrieval cues), these findings indicate that TRPD children may suffer from poorly developed memory strategies which make it difficult for them to access information even when they have once obtained it. Unfortunately, despite a large quantity of work in this area with normal children (Smirnov, 1973), Soviet investigators have apparently not as yet attempted specifically to investigate possible differences between the memory strategies of normal children and those with TRPD.

Psycho-educational performance

Relatively poor academic performance is, of course, the hallmark of TRPD. A number of deficiencies in basic information processing skills which might be assumed to underlie aspects of this poor academic performance have been reviewed in the previous pages. In general, children with TRPD appear to be poorer than their normally achieving age-mates in inhibiting immediate response to stimulation, searching for and grouping information in the visual field, performing systematic visual analyses, processing sensory information under conditions of high distraction, storing and voluntarily accessing information which has been obtained, converting visual-spatial information into a spatio-temporal plan of action, and comprehending a variety of higher-order relationships (e.g., cause and effect, plot lines, etc.).

The question then immediately arises: How do these deficiencies manifest themselves in academic tasks? In what areas of classroom performance are children with TRPD particularly weak and in what areas are they strong? What are the types of errors in academic tasks which are characteristic of children with TRPD? It is clear that effective curriculum design for the child with TRPD requires a knowledge of both characteristic deficiencies in basic information processing skill and characteristic errors and problems associated with primary school performance. In line with this, Soviet defectologists (Pekelis, 1971; Nikashina, 1972; Triger, 1972; Ippolitova, 1972, 1974; Tsypina, 1972) have begun to report both clinical and experimental investigations of the academic performance of children with TRPD. The clinical observations will be discussed in the next section on educational programming; however, the results of the initial experimental work on writing, arithmetic and reading will be quickly summarized here.

Triger (1972) examined the types of errors made by 66 normal and 23 TRPD children given a simple dictation to write at the end of their first year of study in the public school. Although a number of spelling errors which might be traced either to inadequate analysis of the sound of a word or to inadequate mastery of certain grammatical rules (Russian is a highly inflected language with reasonably phonetic spelling-sound patterns) were common to both normal and TRPD children, one class of errors was made only by the TRPD sample. This type of error was that associated with differentiating sentences from a text using capital letters and periods.

Since Russian first graders are taught the use of capitals and periods to differentiate sentences in written speech, the author hypothesized that with dictation of a meaningfully connected text, the TRPD child must fail to perceive the text as a set of sentences, apprehending it rather as a whole which includes the description of a single situation. Having written the first word of the dictation with a capital letter, these children put a period only at the end of the dictation when, in their view, the thought has been completed. To evaluate this hypothesis, Triger presented TRPD subjects with two dictations containing the same number of sentences. The first dictation was a connected description; the second was simply a list of sentences not unified by a single theme.

The results of this dictation experiment supported the above hypothesis. TRPD subjects utilized a significantly higher number of periods and capitals correctly when presented unconnected sentences in dictation than when presented with a unified theme. The author suggests that the TRPD child knows how to employ capital letters and periods (i.e., he knows the general rules of their use) and that he even has a limited concept of a sentence as constituted by a single unified collection of words; but that his knowledge of sentences is not sufficiently well-developed to allow him to differentiate sentences out of connected discourse. A further implication which might be drawn from this result is that TRPD children may suffer from deficiencies in auditory analytic ability which in some ways parallel those problems which they have in analyzing the visual field. Although there is little evidence in the Soviet literature which touches directly on this issue, it is certainly an area which bears exploration, particularly because of the obviously detrimental effect which poor auditory analysis would have on the TRPD child's attempts to learn to read.

The characteristic performance of TRPD children in solving arithmetic problems has been studied by Ippolitova (1972, 1974). In one investigation (Ippolitova, 1972), 20 8 to 9-year-old TRPD and 15 8-year-old normal subjects were given two-column addition and subtraction problems to solve in their heads. Efficient two-column mental arithmetic requires that the child be able to break numbers down into their components, add or subtract components, and then recombine to find the appropriate sums or remainders. Thus, for example, an efficient method of adding 34 and 17 mentally is to decompose 34 into 30 and 4, 17 into 10 and 7, add the 30 and 10 to get 40, add the 4 and 7 to get 11, and add the 40 and 11 to reach the sum of 51. With practice, this procedure can become highly automatic and much faster than adding in columns (i.e., 7 + 4 = 11; remember a 1 and carry a 1; (1) + 1 + 3 = 5; therefore 17 + 34 = 51), particularly for larger numbers, since it requires considerably less mental record keeping.

Even though the problems presented to the children in this study were quite simple, TRPD children were able to solve only 40% of them in their heads as compared to 93 % solved by normal students. To elucidate the source of difficulty among TRPD subjects, Ippolitova asked them, among other things, to decompose simple numbers (e.g., 5 and 8) into their component parts. Thus the child was asked, for example, "what is 5 made up of?" While 90% of the normal students exhibited a clear conception of the task and a high level of ability to respond accurately, almost 80% of the TRPD students had not yet mastered the composition of numbers under 10.

In order to assist TRPD subjects to comprehend the task investigators presented them with various visual aids in which numbers of objects were broken down into their component groupings (e.g., the child might have been shown a picture of five leaves in groups of two and three). Presenting these materials to the children for short intervals (3 seconds) and asking them to tell the experimenter how many objects they saw demonstrated that TRPD subjects, unlike normals, initially made little use of quick search and grouping processes and instead tried to count objects one by one. This is, of course, strongly reminiscent of the earlier reported finding by Shoshin that visual search and grouping skills are poorly developed in TRPDs. With initial simplification and repeated presentation of these materials and coaching from the experimenter, however, some of the TRPD subjects were eventually able to profit from these tasks to improve their ability to sub divide numbers into components. A number of TRPD children though, did not improve, remaining at the lowest level and continuing to depend on one by one counting for numerical determination.

In a second study, Ippolitova (1974) first presented 25 9-year-old TRPD and 15 8-year-old normal children with verbal arithmetic problems of the form: "A boy found 9 pine cones, while a girl found 7 pine cones more. How many pine cones did the girl find?" Each child was asked to solve the problems both arithmetically (i.e., using paper and pencil) and then practically (i.e., using pine cones and placing them next to figurines of a boy and a girl). Normal students had no difficulty with this task in either condition, and students with TRPD were fairly successful (88% at solving the problem arithmetically. When asked to solve the same problem practically, however, the majority of TRPD subjects were at first incorrect. Thus 10 TRPD subjects correctly placed 9 pine cones next to the boy, but only 7 next to the girl; and 8 others placed 9 pine cones next to the boy but all of the remaining cones next to the girl. On being told to reread the problem, think about their earlier arithmetic solution, and try it again, however, all of the TRPD subjects were able to achieve a correct solution.

From the above results, it would appear that there is a strong tendency among children with TRPD to apply arithmetic calculational procedures to the solution of a problem in a relatively rote, stereotyped fashion, without seeing the connection between these procedures and practical activity. In addition, there is a strong suggestion from the form of these children's errors in the practical task, that they do not possess sufficiently well-developed concepts of "more than" and "less than" to guide their practical action. Specifically, as in the previously reported study (Ippolitova, 1972), TRPD children do not appear to realize that a statement like "seven more than X" refers to two distinct components, X and 7, and that constructing X + 7 requires first matching X and then adding 7 to this quantity.

Ippolitova investigated this possibility by presenting the children with another set of similar problems (e.g., "place two more books on the shelf than are on the table"), followed by training in the concepts of "more than" and "less than" and then by several tasks designed to assess the generalization of training effects. The central idea of the training routine was to induce the child to conceive of "more than" as equivalent to "as many as plus" and "less than" as equivalent to "as many as minus."

The results of administration of the initial arithmetic tasks were quite similar to those obtained using the original set of problems. Among the

TRPD subjects, 40% understood quantities only absolutely (e.g., putting only 2 books on the shelf), 25% appeared to respond randomly, and 5% used all available objects (e.g., putting all of the books on the shelf). However, after training in the concepts of "more than" and "less than," most of the TRPD children were able not only to perform correctly but to transfer their newly learned skill to tasks which were similar in content but required operation not with discrete objects but with objects which were combined into a single unit (e.g., "build a house using two blocks fewer than this one").

Taken together, the results of these two studies of the solution of arithmetic problems by 8- and 9-year-old TRPD subjects suggest that the development of certain number and number related concepts which require the analysis of a whole quantity into components is delayed in children with TRPD. It is tempting to hypothesize that this relatively slow development is at least a partial reflection of the TRPD child's relatively poor visual analytic ability since many of the cues for the differentiation of quantities into components would likely be visual-spatial cues. However, the research necessary to evaluate such an hypothesis remains to be done.

Finally, reading, even more than writing and arithmetic, is a task in which children with TRPD are known to encounter serious difficulties. Information on reading errors in 1st-grade TRPD subjects has been provided by Tsypina (1972). She performed a three part study in which she first collected individually tape recorded samples of oral reading of a simple 94 word passage by children who had failed in 1st grade and been placed in an experimental classroom in the regular school. This initial evaluation was conducted at the start of the child's second year in school and first year in the experimental program.

Her results indicated that TRPD reading rate was generally very low (15 words per minute), rarely did reading progress by syllables, and "adding on" (repeatedly returning to the beginning of a word and gradually accumulating sounds) was common.

In order to assess the degree to which errors of this type were specific to TRPD children, a second component was added to the study. A group of TRPD subjects who, in Tsypina's terms, had reached the end of the "alphabetic period" and a group of normal students were matched for reading achievement. All subjects, in other words, had mastered the alphabet and sound-letter correspondences but were still not reading by syllables. In general, the TRPD subjects at this point were midway through their second year in school and normal students were midway through their first year. TRPD subjects were therefore a year older than the normal subjects on the average.

Each child was given a paragraph to read and to retell in his own words. Following the retelling, the child was also asked to answer questions about the content of the paragraph which had been read. Under these conditions, normal and TRPD subjects were found to be equivalent on letter knowledge, ability to join letters into syllables and words, and reading speed (about 26 words per minute). In addition, both groups tended equally to confuse letters for which the distinctive feature was a spatial element. However, while TRPD subjects made 1 1/2 times fewer errors overall and were able to retell the story much more fluently (though briefer) than normals, these same TRPD children were totally unable to answer questions about the causal connections between events in the story. Normal subjects, on the other hand, although finding the retelling problematic had little difficulty with the comprehension task.

A third component of the study consisted of a reevaluation (with a control for possible improvement due to retesting) of reading performance at the conclusion of the school year. The results indicated that both groups had significantly improved their reading speed and normal students had progressed somewhat beyond TRPDs (40 vs. 34 words per minute). Transposition of letters and poor differentiation of consonants had dropped out of the performance of both groups, and, in general, errors of all kinds had declined. This decline was much more dramatic for normal students (28 to 9 on the average) than for TRPDs (19 to 16 on the average). Of particular interest, the number of impulsive guessing errors made by children in the two groups showed opposite trends. While TRPD subjects had made an average of only 2 such errors when tested at the end of the alphabetic period, they now made an average of 4 guessing errors apiece. Normal subjects, on the other hand, had been making 4 such errors each at the end of the alphabetic period but by the final evaluation this had decreased to 2.

A number of conclusions can be drawn from Tsypina's results. On the one hand, it is obvious that although the TRPD child acquires reading skills at a considerably slower rate than does the normal child, he encounters many of the same problems encountered by the normal child. Matched for stage of acquisition, the normal and the TRPD child are much alike on many variables of reading performance. On the other hand, however, it is also clear that the capacities of the TRPD child can not be simply equated with those of the younger normal. To the contrary, there are some problems in reading acquisition which appear to be particularly characteristic of TRPD. In general, these difficulties mirror those already discussed in the previous review of the experimental literature. For example, the fact that TRPD children are capable of reasonable fluency in retelling a story which they have read but that reading and retelling apparently proceed without comprehension of the logical relations inherent in the story is strongly reminiscent of the findings (also reported by Tsypina, 1974) of the "dandelion story" experiment. In that task, which involved listening to a story, as in this task, which required reading, TRPD subjects did not as a rule appear to suffer from either an impoverished language ability or a deficiency in rote memory capacity, but rather from a relative inability to extract the important logical relations from the information with which they had been presented.

Another characteristic manifested by TRPD subjects in reading which appears to reinforce previous findings is a tendency toward increased impulsivity. The existence of an increase in the number of impulsive guesses by TRPDs over the course of the second half of the experimental year, despite the subjects' increased age and improved reading skill, corroborates the findings of high TRPD impulsivity reported by Lubovskii (1972), using a motor-conditioned response task, by Egorova (1969), in a visual analysis task, and by Zharenkova (1972), employing model construction. Apparently, impulsivity is broadly characteristic of the performance of the TRPD child. Unfortunately, however, as was the case with the Zharenkova and Egorova studies, it is difficult to know whether the impulsivity manifested by TRPD children in reading is primarily a function of an inability to inhibit immediate response to stimulation (as it was presumed to be in the Lubovskii paradigm) or of underdeveloped visual analytic abilities. Indeed, it is quite possible that TRPD children suffer in some measure from both. If so, the question of which is the primary and which is the derived deficit must be left to future research.

Educational Programming for Children with TRPD

Like the psychological research with TRPD children which has just been reviewed, Soviet work on educational diagnosis and the development of instructional programs for the learning disabled child is of recent inception. The programs which exist are still very much in the experimental stage. Descriptions of portions of this experimental programming have been provided by Pekelis (1971) and by Nikashina (1972).

While a detailed review of the specific curricular materials and methods currently under development in the USSR would be far beyond the scope of this paper, there are a number of general principles of educational program development in the Soviet literature which bear discussion. These principles are evident in virtually all of the specific curricular descriptions which have so far been made available, and they are structured so as to compliment the diagnostic and experimental psychological research with TRPD children which has already been described.

Although Soviet sources have not summarized the principles which guide educational development for the learning disabled child in precisely this way, it would appear to be generally in keeping with the spirit of Soviet educational programming to consider the main characteristics of their approach under the following six headings: 1) Integration of instruction with systematic observation; 2) design of materials and methods based on task analysis; 3) individualization of instruction; 4) gradual transition to independent performance; 5) coordination of theory with practice; and 6) emphasis on motivational variables. Each of these will be briefly discussed in turn.

Integration of instruction with systematic observation. One of the prominent goals of Soviet educational programming is to arrange the instructional process in such a way that the teacher has "extensive and current daily information on the state of the pupil's knowledge" (Korolev, 1962, page 55). Only with such information will the teacher be able to gear the materials and methods employed in instruction to the changing needs of the child. In order to achieve that goal, systematic observation of the child's performance in the classroom must be built into the curriculum itself.

An example of the way in which observation of the child's performance can be integrated into the classroom and employed in the creation of appropriate instructional techniques has been provided in summary fashion by Nikashina (1972) in a description of the results of a year-long observation of TRPD children placed in an experimental class. Although the intent of this section to deal only with the major principles of programming exhibited by the Soviet TRPD educational literature will generally require the exclusion of detail, two specific aspects of Nikashina's report are nonetheless of interest for their relation to general principles. The first is that the observations which she described are clearly focused at two levels, at the general debilatory characteristics of the TRPD learner and at the task specific problems which he encounters in the mastery of particular skills. It is evident that information derived from both levels of observation is essential to the development of a thoroughly appropriate curriculum. The second aspect of her report of interest here is encompassed by the results of her general level observation. TRPD children in this experimental classroom appeared to be hampered in the learning of new material across tasks by: 1) substantial gaps in their knowledge; 2) a high degree of impulsivity; 3) difficulty in the spontaneous generalization and transfer of information; and 4) heightened fatigability and consequent frequent attentional lapses. These observations obviously compliment the experimental results already reviewed, but more importantly for our present purposes, each can as well be seen to be reflected in the form of the specific implementation for TRPD children of the general principles of instructional design which remain to be discussed.

Design of materials and methods based on task analysis. The most successful instructional presentations are those which analyze the logical structure of a task and break it up into its components in a coherent fashion without losing sight of the task as a whole (Monoszon, 1963). Thus, Soviet educational programming is based on an analysis of task requirements, and these, in combination with the information obtained from observations of the strengths and weaknesses of the children to be taught , jointly determine the materials and methods of instruction to be employed.

The specific implications of this principle for educational programming with TRPD children are several. First, when planning instruction for the disabled learner, the specification of knowledge prerequisite to successful mastery of a new task must proceed with particular care. As noted by Nikashina (1972), the TRPD child is likely to have gaps in his knowledge--knowledge which the normal student might be almost automatically assumed to bring to the task of learning. Careful specification of prerequisite information allows the teacher to assess the child's readiness for instruction and, when necessary, to begin instruction with lessons directed toward providing the child with the knowledge which he will need. In the Soviet literature, in other words, there is a heavy emphasis placed on the necessity of careful preparatory work with TRPD children (Monoszon, 1963; Leushina, 1964).

A second implication of the task analysis principle for work with TRPD students is that specification of the higher-order techniques for the organization of information seeking activity appropriate to a particular task must also be given careful attention. The self-organization of activity for maximally effective extraction of information from task materials is another area in which TRPD children are often particularly weak. These organizational skills should include logical methods of searching for problem solution (Menchinskaia and Kalmykova, 1963), observational techniques to improve the child's access to information in the situation (Nikashina, 1972), and methods of self-control geared to increase the child's ability to inhibit his immediate response to stimulation when appropriate (cf., Pekelis, 1971, for a description of a number of interesting techniques for the training of inhibition). The importance which Soviet educators place upon providing the child with the tools for the self-organization of activity is perhaps best reflected in a statement by Montaigne which is quoted approvingly by Korolev (1962): "'If you know something by heart you do not necessarily know it'; 'A well organized head is better than a well filled one.'" (page 58).

Individualization of instruction. The importance of individualizing instructional techniques to match the particular strengths and weaknesses of the learner and particularly the TRPD learner is one of the most commonly mentioned characteristics of good educational programming in the Soviet literature (Korolev, 1962; Menchinskaia and Kalmykova, 1963; Monoszon, 1963; and many others). As Korolev (1962) reiterates: "The use of a rational system of methods in teaching fundamentals and an individual approach to pupils are the most important conditions for the prevention of failure and repeating" (page 53).

In the case of the TRPD student, the principle of individualized instruction is particularly important since the level of the child's abilities in an array of different tasks requiring different processing skills may vary widely. This wide variation, when properly and individually diagnosed, allows the teacher to draw upon skills which the TRPD child has mastered to compensate at least partially for his deficiencies. As Krutetskii (cited in Menchinskaia and Kalmykova, 1963) formulated the general principle, it is a question of "attack on weaknesses from positions of strength" (page 12). What the child is good at should be employed in the teaching of skills which have yet to be mastered. It is probably worth remarking at this point that this instructional design principle of the individualization of the learning experience can only be followed when the ideal of a substantial role for the teacher in ongoing educational observation and diagnosis, as previously discussed, is also met. The integration of observation and instruction and the individualization of that instruction so as to make the most of potential compensations afforded by the child's developmental strengths must go hand in hand.

Gradual transition to independent performance.

In order for the teacher to be involved in instruction and observation in an individualized fashion, all of his instructional time cannot be spent in group lessons, recitations, oral review and the like. There is evidence (Korolev, 1962; Menchinskaia and Kalmykova, 1963; Monoszon, 1963) that this traditional format for education is being gradually replaced in the Soviet

Union by an approach which emphasizes the child's own active and independent approach to the learning materials. As Korolev (1962) points out, the teacher's role should be one of organizing independent work. "The process whereby new knowledge is acquired must change fundamentally. It must not be an explanation of the material by the teacher with the pupils listening attentively; it must be the organization of the acquisition of new knowledge by the pupils during the lesson itself" (page 56). This is echoed by Monoszon who notes that "the key to increasing the effectiveness of the teaching process is to direct the independent thinking activity of every single pupil" (page 22).

Unfortunately, however, transition to independent performance is a particularly difficult principle to follow with the TRPD child, who usually suffers most in tasks which require his independent organizing activity. In addition to instructing the child in the use of specific organizational techniques as already noted, one way of achieving this goal with TRPD students is to provide the child with a much broader series of lessons than his normally developing peers so that there is a gradual transition from the simplest skills which he is required to master to those which are more complex (Nikashina, 1972). The teacher should start with that which the child knows but not spend too much time on it, always providing him with tasks which make him think and use what he knows actively (Korolev, 1963). Although it may be necessary for the teacher to be more actively involved with the child at the beginning of a learning sequence, properly designed instruction progressively transfers the activity to the student, freeing the teacher for organization and observation.

Coordination of theory with practice. The importance of the teacher's continually correlating factual material with practical generalizations, verbally communicated information with action in a practical context, is also one of the most commonly cited principles of Soviet education (Korolev, 1962; Menchinskaia and Kalmykova, 1963; Monoszon, 1963; and Nikashina, 1972). The close integration of both theoretical knowledge and practical skill is thought to improve both by providing a basis for deeper comprehension of theory and more knowledgable and better organized action. Although this principle is observed in instructional development in all content areas (Menchinskaia and Kalmykova, 1963), it is thought to be particularly important in subjects which have a specifically theoretical character, such as mathematics. Thus, for example, the child is not only taught to think mathematically, but to think mathematically about objects and to apply his mathematical knowledge to objects (cf., Pekelis, 1971, and Leushina, 1964, for details of mathematical curricula).

This emphasis on the practical application of knowledge and on the teaching of new skills in a practical context helps in part to overcome the TRPD child's well-documented difficulties in discrimination and the appropriate generalization and transfer of newly learned material. This is particularly true, as Nikashina (1972) has noted, when the TRPD child is provided with both a deliberately broad series of lessons and specific experiences in the generalization and transfer of new knowledge to practical work. In addition, Menchinskaia and Kalmykova (1963) suggest the necessity of systematically varying the material to be used in instruction. Poor students in particular suffer from the monotony of exercises, tending to fall quickly into a mechanical, stereotyped, and invariably impulsive responding. In order to keep the student actively involved in learning, force him to extend his knowledge and to make finer discriminations which can serve as the basis for appropriate gneralization and transfer, the teacher should utilize the "method of so-called intermittent contrasting... wherein the pupil is first introduced to one of two similar concepts or rules, then a second concept is introduced on the basis of a comparison with the first. By comparing both concepts or rules, the pupils are able to single out their similarities and to emphasize those features indicating their differences. Next the pupils are given exercise where the two new ideas are alternated"(Menchinskaia and Kalmykova, 1963, page 11). Proceeding in this way, the child is kept actively engaged in the process of picking up information and formulating rules on the basis of that information. When this instructional approach is coupled with an active correlation of rules to practical activity with objects, it contributes greatly to providing the TRPD child with an appropriate basis for the generalization and transfer of new learning.

Emphasis on motivational variables. The student's attainment of increasing independence in learning is obviously intimately related to his level of motivation. This, together with a characteristic concern in the Soviet Union with issues relating to socio-motivational development or "upbringing," has led to a systematic emphasis on motivational issues in Soviet educational programming. A number of the principles of instructional design already discussed can be seen to be related to these issues. Thus, for example, one of the benefits of careful task analysis and specification of knowledge prerequisite to instruction in various skills lies in the fact that providing the child with the information which he will need to know prior to beginning instruction greatly reduces the potential for instruction to be frustrating. Similarly, variation in lessons and instruction in the context of practical activity, while it assists the child in the generalization and transfer of new learning, also helps to avoid the monotonous repetition of material which can reduce the child's motivation to engage himself actively in the task (Korolev, 1962).

In addition to the positive motivational components of these general principles, there are some specific techniques employed by Soviet teachers to increase the child's motivation. One such technique which is particularly helpful with the IRPD child whose interests tend often to be more focused on play than on the learning of academic skills is the use of play in teaching. At the early ages, instruction may be initially only incidental to play, with the ratio of play to instruction changing only very gradually over time (cf. Pekelis, for a good description of this approach); and even at older ages (Menchinskaia and Kalmykova, 1963), the use of didactic games in which the child may, for example, learn a number of simple mathematical concepts while "playing" store is quite common.

Lastly, peer teaching and peer encouragement are an essential part of the motivational structure of the classroom. The peer group, or "children's collective," is organized to promote the success of each individual student (Menchinskaia and Kalmykova, 1963). Youth organizations such as the Young Pioneers and Komsomol foster "mutual study and work assistance, and various kinds of extracurricular activity, such as study circles, olympiads in school subjects, lessons in work, etc."(Monoszon, 1963, page 21).

Conclusion

Although psychological research and educational programming with the learning disabled child is a relatively new aspect of Soviet defectology, it can be seen that major steps have already been taken to provide these children with scientifically designed opportunities for the development of their full potential. Furthermore, the research and experimental instructional programming which has been completed gives promise of even more fruitful work to follow. Two major factors apparently contribute to the potential shown by Soviet defectology in this area. First, the administrative organization of Soviet defectological work, unified as it is under the Institute of Defectology, appears to be highly conducive to the fruitful interaction of research and practice. Second, the intellectual organization of Soviet defectology, characterized by the relatively close integration of philosophical principle, psychological research and theorization, and instructional design seems well suited to fostering the development of a consciously directed, psychologically and educationally valid instructional program for the learning disabled child.

In the Soviet Union, philosophical direction provides a reasonably coherent metatheoretical system for psychology and prescribes a close interaction between research geared to produce knowledge and application of knowledge to improve practical action. Psychological and psychophysiological research contributes to the improvement of multi-faceted differential diagnosis and provides information concerning the development of children's processing capacities essential for the design of effective instructional materials and methods. Lastly, Soviet educational programming is apparently already beginning to embody many of the principles which have issued from both philosophical discussion and psychological research and it gives promise of moving quickly from the experimental stage to the provision of broad-scale instructional programs tailored to meet the special needs of the learning disabled child. In the coming years, it will be interesting to observe the degree to which this promise is fulfilled.

REFERENCES

Afanas'ev, V. *Marxist philosophy*. Moscow: Progress Publishers, 1968.

Brozek, J. To test or not to test: Trends in the Soviet views. *Journal of the History of the Behavioral Sciences*, 1972, *8*, 243-248.

Capute, A. J., Niedermeyer, E. F. L. and Richardson, F. The electroencephalogram in children with minimal cerebral dysfunction. *Pediatrics,* 1968, *41*, 1104-1114.

Daulianskene, IU. I. Tserebral'naia patologiia i trudnosti obucheniia (Cerebral pathology and learning difficulties). *Defektologiia*, 1973 (2), 13-15.

Dem'ianov, IU. G. Osobennosti nevropatii u detei so shkol'noi neuspevaemost'iu (Characteristics of neuropathy in children with poor progress in school). In T. A. Vlasova and M. S. Pevzner (Eds.), *Deti s vremennymi zaderzhkami razvitiia* (Children with temporary retardation in development). Moscow: Pedagogika, 1971.

D'iachkov, A. I. The special schools. *Soviet Education*, 1964, *7*(2), 14-20.

D'iachkov, A. I. (Ed.), *Osnovy obucheniia i vospitaniia anomal'nykh detei* (Principles of the education and rearing of abnormal children). Moscow: Prosveshchenie, 1965.

D'iachkov, A. I. The development of Soviet defectology. *Soviet Education*, 1968, *10* (5), 44-55.

D'iachkov, A. I. (Ed.), *Defektologicheskii slovar'* (Defectological dictionary). Moscow: Pedagogika, 1970.

Egorova, T. V. Analiz zritel'no vosprinimaemykh ob'ektov neuspevaiushchimi shkol'nikami mladshikh klassov (Analysis of visually perceived objects by failing students in the early grades). *Defektologiia,* 1969 (2), 29-37.

Egorova, T. V. Svoeobrazie protsessa zapominaniia u detei s zaderzhkoi psikhicheskogo razvitiia (Aspects of the memory process in children with retardation in psychological development). *Defektologiia*, 1972 (4), 16-23.

Gal'perin, P. IA. An experimental study in the formation of mental actions. In B. Simon (Ed.), *Psychology in the Soviet Union*. Stanford, California: Stanford University Press, 1957.

Gearhart, B. R. *Learning disabilities: Educational strategies*. St. Louis: C. V. Mosby Co., 1973.

Gray, J. A. Pavlov's typology. Oxford: Pergamon Press, 1964.

Ippolitova, M. V. Osobennosti usvoeniia sostava chisla det'mi s zaderzhkoi psikhicheskogo razvitiia (Aspects of the mastery of numerical composition in children with retardation in psychological development). Defektologiia, 1972 (5), 29-35.

Ippolitova, M. V. Izuchenie trudnostei resheniia arifmeticheskikh zadach u detei s zaderzhkoi psikhicheskogo razvitiia (A study of difficulties of solving arithmetic problems in children with retarded development). Defektologiia, 1974 (1), 3-11.

Ivanov, E. S. Asteniia kak odna iz prichin neuspevaemosti detei v shkole (Asthenia as one of the reasons for failure in school children) In T. A. Vlasova and M. S. Pevzner (Eds.), Deti s vremennymi zaderzhkami razvitiia (Children with temporary retardation in development). Moscow: Pedagogika, 1971.

Ivanov-Smolenskii, A. G. Developmental paths of experimental research into the work and interaction of the first and second signalling systems. In A. G. Ivanov-Smolenskii (Ed.), Works of the Institute of Higher Nervous Activity. Pathophysiological Series. Vol. II. Jerusalem: Israel Program for Scientific Translations for the National Science Foundation, 1960.

Korolev, F. F. Ways and means of overcoming repeating and drop-outs. Soviet Education, 1962, 4 (10), 51-59.

Lebedinskii, M. S. and Miasishchev, V. N. Vvedenie v meditsinskuiu psikhologiiu (Introduction to medical psychology). Leningrad: Meditsina, 1966.

Lenin, V. I. Materialism and empirio-criticism. New York: International Publishers, 1927.

Leont'ev, A. N. Problema deiatel'nosti v psikhologii (The problem of activity in psychology). Voprosy Filosofii, 1972 (9), 95-108.

Leont'ev, A. N. and Luria, A. R. The psychological ideas of L. S. Vygotskii. In B. B. Wolman (Ed.), Historical roots of contemporary psychology. New York: Harper and Row, 1968.

Leushina, A. M. Reasons for the failure of first-graders in arithmetic. Soviet Education, 1964, 6 (3), 7-16.

Lubovskii, V. I. Vysshaia nervnaia deiatel'nost' i psikhologicheskie osobennosti detei s zaderzhkoi razvitiia (Higher nervous activity and psychological characteristics of children with a retardation in development). Defektologiia, 1972 (4), 10-16.

Luria, A. R. The problem of the cultural behavior of the child. Journal of Genetic Psychology, 1928, 35, 493-506.

Luria, A. R. The nature of human conflicts. New York: Liveright Publishers, 1932.

Luria, A. R. The role of language in the formation of temporary connections. In B. Simon (Ed.), Psychology in the Soviet Union. Stanford, California: Stanford University Press, 1957.

Luria, A. R. The role of speech in the regulation of normal and abnormal behavior. In A. R. Luria (Ed.), Problemy vysshei nervnoi deiatel'nosti normal'nogo i anomal'nogo rebenka (Problems of the higher nervous activity of the normal and abnormal child). Volume II. Moscow: Academy of Pedagogical Sciences of the RSFSR, 1958.

Luria, A. R. The directive function of speech in development and dissolution. Word, 1959, 15, 453-464.

Luria, A. R. Study of the abnormal child. American Journal of Orthopsychiatry, 1961, 31, 1-16.

Luria, A. R. Higher cortical functions in man. New York: Basic Books, 1966.

Luria, A. R. L. S. Vygotsky and the problem of functional localization. Soviet Psychology, 1967, 5 (3), 53-57.

Luria, A. R. Osnovy neiropsikhologii (Foundations of neuropsychology), Moscow: Moscow University, 1973.

Luria, A. R. and Tsvetkova, L. S. Rehabilitative education and its importance for psychology and pedagogy. Soviet Education, 1966, 8 (5), 46-55.

Meacham, J. A. The development of memory abilities in the individual and society. Human Development, 1972, 15, 205-228.

Meichenbaum, D. H. and Goodman, J. Training impulsive children to talk to themselves: a means of developing self-control. Journal of Abnormal Psychology, 1971, 77, 115-126.

Menchinskaia, N. and Kalmykova, Z. Problems in overcoming failures in learning. Soviet Education, 1963, 5 (12), 9-14.

Monoszon, E. A successful experiment in overcoming failures and nonpromotion. Soviet Education, 1963, 5 (6), 19-25.

Nikashina, N. A. Pedagogicheskoe izuchenie detei s zaderzhkoi psikhicheskogo razvitiia (A pedagogical study of children with retardation in psychological development). *Defektologiia*, 1972 (5), 7-12.

Opolinskii, E. S. Sravnitel'naia otsenka po dannym reoentsefalografii osobennostei mozgovogo krovoobrashcheniia u zdorovyx detei i u detei s zaderzhkoi razvitiia (Comparative evaluation from rheoencephalagraphic data of aspects of the circulation of blood in the brain in healthy children and in children with retardation in development). *Defektologiia*, 1972 (2), 39-43.

Pavlov, I. P. *Lectures on conditioned reflexes*. New York: International Publishers, 1928.

Pavlov, I. P. *Conditioned reflexes and psychiatry*. New York: International Publishers, 1941.

Payne, T. R. *S. L. Rubinštejn and the philosophical foundations of Soviet psychology*. New York: Humanities Press, 1968.

Pekelis, E. IA. Pedagogicheskaia kharakteristika detei s zaderzhkoi psikhicheskogo razvitiia i rabota c nimi (Pedagogical characteristics of children with a retardation in psychological development and work with these children). In T. A. Vlasova and M. S. Pevzner (Eds.), *Deti s vremennymi zaderzhkami razvitiia* (Children with temporary retardation in development). Moscow: Pedagogika, 1971.

Peresleni, L. I. Nekotorye osobennosti vnimaniia u detei s otkloneniiami v razvitii (Some aspects of attention among children with developmental deficiencies), *Defektologiia*, 1972 (4), 23-28.

Pevzner, M. S. *Oligophrenia. Mental deficiency in children*. New York: Consultants Bureau, 1961.

Pevzner, M. S. (Ed.), *Deti s otkloneniiami v razvitii* (Children with developmental deficiencies). Moscow: Prosveshchenie, 1966.

Pevzner, M. S. Klinicheskaia kharakteristika detei s zaderzhkoi razvitiia (Clinical characteristics of children with retarded development). *Defektologiia*, 1972 (3), 3-9.

Raiskaiia, M.M., Iavkin, V.M. and Egorova, T.V. Klinicheskoe izuchenie shkol'noi neuspevaemosti (Clinical investigations of failing students). *Defektologiia*, 1969 (3), 91-95.

Reidiboim, M. G. Materialy klinicheskogo izucheniia neuspevaiushchikh shkol'nikov (Materials for the clinical study of failing school children). *Defektologiia*, 1972 (3), 15-21.

Rubinshtein, S. Ia. L.S. Vygotsky on the psychological development of mentally retarded children. *Soviet Education*, 1972, *14* (1-3), 6-19.

Shevchenko, S. G. Osobennosti znanii i predstavlenii o blizhaishem okruzhenii u pervoklassnikov s zaderzhkoi psikhicheskogo razvitiia (Aspects of knowledge and representation of immediate surroundings in first-graders with retardation in psychological development). *Defektologiia*, 1974 (1), 19-26.

Shif, Z. I. Development of children in schools for the mentally retarded. In M. Cole and I. Maltzman (Eds.), *A handbook of contemporary Soviet psychology*. New York: Basic Books, 1969.

Shoshin, P. B. Opoznavanie prostykh izobrazhenii det'mi s zaderzhkoi psikhicheskogo razvitiia (Recognition of simple pictures by children with temporary retardation in psychological development). *Defektologiia*, 1972 (4), 35-40.

Simon, B. Introduction. In B. Simon (Ed.), *Psychology in the Soviet Union*. Stanford, California: Stanford University Press, 1957.

Smirnov, A. A. *Problems of the psychology of memory*. New York: Plenum Press, 1973.

Sokolov, Ye. N. *Perception and the conditioned reflex*. New York: Pergamon Press, 1963.

Teplov, B. M. and Nebylitsyn, V. D. Investigation of the properties of the nervous system as an approach to the study of individual psychological differences. In M. Cole and I. Maltzman (Eds.), *A handbook of contemporary Soviet psychology*. New York: Basic Books, 1969.

Triger, R. D. Nedostatki pis'ma u pervoklassnikov s zaderzhkoi psikhicheskogo razvitiia (Deficiencies in writing among first graders with retardation in psychological development). *Defektologiia*, 1972 (5), 35-41.

Tsymbaliuk, A. N. Ponimanie ciuzhetnoi kartiny v usloviiakh obuchaiushchego eksperimenta det'mi s zaderzhkoi razvitiia (Comprehension of a picture with a plot under conditions of a training experiment in children with retarded development). *Defektologiia*, 1973 (3), 25-32.

Tsypina, N. A. Oshibki v chtenii u pervoklassnikov s zaderzhkoi psikhicheskogo razvitiia (Reading errors in first graders with retardation in psychological development). *Defektologiia*, 1972 (5), 41-48.

Tsypina, N. A. Ponimanie prochitannogo teksta pervoklassnikami s zaderzhkoi psikhicheskogo razvitiia (Comprehension of an aurally presented text by first graders with retardation in development). *Defektologiia*, 1974 (1), 11-19.

Vaizman, N. P. K voprosu differentsial'noi diagnostiki oligofrenii i zadershek razvitiia (On the question of the differential diagnosis of oligophrenia and retardation in development). In T. A. Vlasova and M. S. Pevzner (Eds.), *Deti s vremennymi zaderzhkami razvitiia* (Children with temporary retardation in development). Moscow: Pedagogika, 1971.

Vlasova, T. A. Kazhdomu rebenku--nadlezhashchie usloviia vospitaniia i obucheniia (Each child should have appropriate conditions for upbringing and education). In T. A. Vlasova and M. S Pevzner (Eds.), *Deti s vremennymi zaderzhrami razvitiia* (Children with temporary retardation in development). Moscow: Pedagogika, 1971.

Vlasova, T. A. New advances in Soviet defectology. *Soviet Education*, 1972, *14* (1-3), 20-39.

Vlasova, T. A. and Pevzner, M. S. (Eds.), *Deti s vremennymi zaderzhkami razvitiia* (Children with temporary retardation in development) Moscow: Pedagogika, 1971.

Vygotskii, L. S. The problem of the cultural development of the child. II. *Journal of Genetic Psychology*, 1929, *36*, 415-434.

Vygotsky, L. S. *Thought and language*. Cambridge: MIT Press, 1962.

Wender, P. H. *Minimal brain dysfunction in children*. New York: Wiley-Interscience, 1971.

Wortis, J. *Soviet psychiatry*. Baltimore: Williams and Wilkins Co.,1950.

Wozniak, R. H. Dialecticism and structuralism: The philosophical foundations of Soviet psychology and Piagetian cognitive developmental theory. In K. Riegel (Ed.), *Structure and transformation: Developmental aspects*. New York: Wiley, 1975, in press.

Wozniak, R. H. and Neuchterlein, M. *Reading improvement through verbally self-guided looking and listening*. University of Minnesota Research, Development, and Demonstration Center in Education of Handicapped Children Teacher's Report, 1973.

Zabramna, S. D. (Ed.), *Otbor detei vo vspomogatel'nye shkoly* (The selection of children for schools for the mentally retarded). Moscow: Prosveshchenie, 1971.

Zeigarnik, B. V. *The pathology of thinking*. New York: Consultant's Bureau, 1965.

Zemtsova, M. I. Characteristics of perceptual activity in the blind. In M. Cole and I. Maltzman (Eds.), A handbook of contemporary Soviet psychology. New York: Basic Books, 1969.

Zharenkova, G. I. Deistviia detei s zaderzhkoi psikhicheskogo razvitiia po obraztsu i slovesnoi instruktsii (Performance of children with retardation in psychological development following a model and verbal instructions). Defektologiia, 1972 (4), 29-35.

Zislina, N. N., Opolinskii, E. S. and Reidiboim, M. G. Issledovanie funktsional'nogo sostoianiia mozga po dannym elektroentsefalografii u detei c zaderzhkoi razvitiia (An electroencephalographic investigation of the functional state of the brain in children with retardation in development). Defektologiia, 1972 (3), 9-15.

Table 1.

Range and distribution of performance of normal, TRPD, and MR subjects on a visual analysis task

Performance Level	Number of Features Named	Percentage of Subjects at Each Level		
		Normal	TRPD	MR
	Pre training			
High	12 - 20	60	--	--
Medium High	8 - 11	40	27	15
Medium Low	4 - 7	--	73	65
Low	2 - 3	--	--	20
	Post training			
High	16 - 22	85	3	--
Medium High	11 - 15	15	50	--
Medium Low	6 - 10	--	47	55
Low	4 - 5	--	--	45

Table 2.

Approximate mean latencies, quadratic deviations (QD), and total error scores for normal, TRPD, and MR subjects in an auditory vigilance task

Group	Distraction Condition								
	Noise			Music			Story		
	Latency msecs.	QD	errors	Latency msecs.	QD	errors	Latency msecs.	QD	errors
Normal	380	108	0	390	86	0	420	103	2
TRPD	480	132	0	500	133	0	575	194	6
MR	475	178	0	520	183	0	645	257	64

TECHNICAL REPORTS

University of Minnesota Research, Development and Demonstration
Center in Education of Handicapped Children

(Place of publication shown in parentheses where applicable)

1. D. Moores, S. Fisher & M. Harlow. Post-secondary programs for the deaf: VI. Summary and Report #80. December 1974.

2. M. Harlow, S. Fisher & D. Moores. Post-secondary programs for the deaf: V. Follow-Up Da Report #79. December 1974.

3. R. Wozniak. Psychology and education of the learning disabled child in the Soviet Union. December 1974.

4. M. Thurlow, P. Krus, R. Howe, A. Taylor & J. Turnure. Measurement of Weight Unit: A form Report #77. December 1974.

5. M. Thurlow, P. Krus, R. Howe, A. Taylor & J. Turnure. Money Unit: A formative evaluation December 1974.

6. M. Harlow, D. Moores & S. Fisher. Post-secondary programs for the deaf: IV. Empirical D Report #75. December 1974.

7. C. Mueller & S. Samuels. Initial field test and feasibility study of the hypothesis/test cedures in the special education classroom. Research Report #74. December 1974.

8. P. Krus, M. Thurlow, J. Turnure & A. Taylor. Summative evaluation of the Time with the Cl Measurement and Time Program. Research Report #73. October 1974.

9. P. Krus, M. Thurlow, J. Turnure & A. Taylor. Summative evaluation of the Measurement of W Measurement and Time Program. Research Report #72. October 1974.

10. P. Krus, M. Thurlow, J. Turnure & A. Taylor. Summative evaluation of the Measurement of L Measurement and Time Program. Research Report #71. October 1974.

11. P. Krus, M. Thurlow, J. Turnure & A. Taylor. Summative evaluation of the Money Unit of th and Time Program. Research Report #70. October 1974.

12. P. Krus, M. Thurlow, J. Turnure, A. Taylor & R. Howe. The formative evaluation design of Project. Occasional Paper #31. October 1974.

13. J. Rynders, J. Horrobin, L. Wangsness & J. Swanson. The severe nature of verbal learning Down's Syndrome (mongoloid) children. Research Report #69. August 1974.

TECHNICAL REPORTS

University of Minnesota Research, Development and Demonstration
Center in Education of Handicapped Children

(Place of publication shown in parentheses where applicable)

& M. Harlow. Post-secondary programs for the deaf: VI. Summary and Guidelines. Research
ember 1974.

& D. Moores. Post-secondary programs for the deaf: V. Follow-Up Data Analysis. Research
ember 1974.

gy and education of the learning disabled child in the Soviet Union. Research Report #78.

R. Howe, A. Taylor & J. Turnure. Measurement of Weight Unit: A formative evaluation. Research
ember 1974.

R. Howe, A. Taylor & J. Turnure. Money Unit: A formative evaluation. Research Report #76.

& S. Fisher. Post-secondary programs for the deaf: IV. Empirical Data Analysis. Research
ember 1974.

ls. Initial field test and feasibility study of the hypothesis/test word recognition pro-
pecial education classroom. Research Report #74. December 1974.

J. Turnure & A. Taylor. Summative evaluation of the Time with the Clock Unit of the Money,
Time Program. Research Report #73. October 1974.

J. Turnure & A. Taylor. Summative evaluation of the Measurement of Weight Unit of the Money,
Time Program. Research Report #72. October 1974.

J. Turnure & A. Taylor. Summative evaluation of the Measurement of Length Unit of the Money,
Time Program. Research Report #71. October 1974.

J. Turnure & A. Taylor. Summative evaluation of the Money Unit of the Money, Measurement,
. Research Report #70. October 1974.

J. Turnure, A. Taylor & R. Howe. The formative evaluation design of the Vocabulary Development
onal Paper #31. October 1974.

in, L. Wangsness & J. Swanson. The severe nature of verbal learning deficits in preschool
(mongoloid) children. Research Report #69. August 1974.

14. R. Riegel. Reliability of children's sorting strategies using alternate forms of the SC
#68. August 1974.

15. S. Fisher, D. Moores, & M. Harlow. Post-secondary programs for the deaf: III. Interna
#67. September, 1974.

16. W. Bart. A set-theoretic model for the behavioral classification of environments. Occa

17. D. Krus, W. Bart & P. Airasian. Ordering theory and methods. Occasional Paper #28. Ju

18. B. Egeland & A. Thibodeau. Selective attention of impulsive and reflective children. R

19. R. Hoffmeister, B. Best & D. Moores. The acquisition of sign language in deaf children
Report. Research Report #65. June 1974.

20. P. Krus. Use of family history data to predict intellectual and educational functionin
four to seven. Research Report #64. June 1974.

21. P. Krus. Analyzing for individual differences in evaluating compensatory education prog
June 1974.

22. J. Rondal. The role of speech in the regulation of behavior. Research Report #63. Jun

23. N. Buium, J. Rynders, & J. Turnure. A semantic-relational-concepts based theory of lang
applied to Down's Syndrome children: Implication for a language enhancement progra
May 1974.

24. S. Fisher, M. Harlow & D. Moores. Post-secondary programs for the deaf: II. External
#61. March 1974.

25. D. Moores, M. Harlow, & S. Fisher. Post-secondary programs for the deaf: I. Introducti
Report #60. February 1974.

26. D. Krus. Synopsis of basic theory and techniques of order analysis. Occasional Paper #

27. S. Samuels, J. Spiroff & H. Singer. Effect of pictures and contextual conditions on lea
Paper #25. March 1974.

28. A. Taylor, M. Thurlow & J. Turnure. Elaboration as an instructional technique in the vo
EMR children. Research Report #59. March 1974.

29. N. Buium & J. Turnure. The universality of self-generated verbal mediators as a means o
cesses. Research Report #58. January 1974.

lity of children's sorting strategies using alternate forms of the SORTS test. Research Report
974.

s, & M. Harlow. Post-secondary programs for the deaf: III. Internal view. Research Report
r, 1974.

oretic model for the behavioral classification of environments. Occasional Paper #29. July 1974

P. Airasian. Ordering theory and methods. Occasional Paper #28. July 1974.

bodeau. Selective attention of impulsive and reflective children. Research Report #66. July 1974

Best & D. Moores. The acquisition of sign language in deaf children of deaf parents: Progress
rch Report #65. June 1974.

amily history data to predict intellectual and educational functioning longitudinally from ages
. Research Report #64. June 1974.

for individual differences in evaluating compensatory education programs. Occasional Paper #27.

e of speech in the regulation of behavior. Research Report #63. June 1974.

s, & J. Turnure. A semantic-relational-concepts based theory of language acquisition as
n's Syndrome children: Implication for a language enhancement program. Research Report #62.

w & D. Moores. Post-secondary programs for the deaf: II. External view. Research Report
74.

w, & S. Fisher. Post-secondary programs for the deaf: I. Introduction and overview. Research
ebruary 1974.

of basic theory and techniques of order analysis. Occasional Paper #26. April 1974.

off & H. Singer. Effect of pictures and contextual conditions on learning to read. Occasional
rch 1974.

ow & J. Turnure. Elaboration as an instructional technique in the vocabulary development of
Research Report #59. March 1974.

re. The universality of self-generated verbal mediators as a means of enhancing memory pro-
rch Report #58. January 1974.

30. D. Moores, K. Weiss, & M. Goodwin. Evaluation of programs for hearing impaired children: R
Research Report #57. December 1973.

31. J. Turnure & W. Charlesworth, D. Moores, J. Rynders, M. Horrobin, S. Samuels, & R. Wozniak.
Association Symposium Papers. Occasional Paper #24. December 1973.

32. N. Buium. Interrogative types of parental speech to language learning children: a linguist
Report #56. December 1973.

33. D. Krus. An outline of the basic concepts of order analysis. Occasional Paper #23. Februa

34. D. Krus. Order analysis: A fortran program for generalizable multidimensional analysis of
Occasional Paper #22. November 1973.

35. W. Bart. The pseudo-problem of IQ. Occasional Paper #21. October 1973.

36. J. Turnure & M. Thurlow. Verbal elaboration and the enhancement of language abilities in th
The role of interrogative sentence-forms. Occasional Paper #20. October 1973.

37. P. Dahl, S. Samuels & T. Archwamety. A mastery based experimental program for teaching poor
word recognition skills. Research Report #55. September 1973.

38. R. Riegel, F. Danner & L. Donnelly. Developmental trends in the generation and utilization
tions for recall by EMR and non-retarded children: The SORTS test. Research Report #5

39. R. Hoffmeister & D. Moores. The acquisition of specific reference in the linguistic system
deaf parents. Research Report #53. August 1973.

40. W. Bart & M. Smith. An interpretive framework of cognitive structures. Occasional Paper #1

41. C. Clark & J. Greco. MELDS (Minnesota Early Language Development Sequence) glossary of rebu
Occasional Paper #18. June 1973.

42. J. Turnure. Interrelations of orienting response, response latency and stimulus choice in c
Research Report #52. May 1973.

43. S. Samuels & P. Dahl. Automaticity, reading and mental retardation. Occasional Paper #17.

44. S. Samuels & P. Dahl. Relationships among IQ, learning ability, and reading achievement. Oc
May 1973.

45. N. Buium & J. Rynders. The early maternal linguistic environment of normal and Down's Syndro
learning children. Research Report #51. May 1973.

M. Goodwin. Evaluation of programs for hearing impaired children: Report of 1972-73.
7. December 1973.

worth, D. Moores, J. Rynders, M. Horrobin, S. Samuels, & R. Wozniak. American Psychological
ium Papers. Occasional Paper #24. December 1973.

e types of parental speech to language learning children: a linguistic universal? Research
ber 1973.

the basic concepts of order analysis. Occasional Paper #23. February 1974.

s: A fortran program for generalizable multidimensional analysis of binary data matrices.
22. November 1973.

blem of IQ. Occasional Paper #21. October 1973.

. Verbal elaboration and the enhancement of language abilities in the mentally retarded:
gative sentence-forms. Occasional Paper #20. October 1973.

Archwamety. A mastery based experimental program for teaching poor readers high speech
ills. Research Report #55. September 1973.

. Donnelly. Developmental trends in the generation and utilization of associative rela-
EMR and non-retarded children: The SORTS test. Research Report #54. August 1973.

es. The acquisition of specific reference in the linguistic system of a deaf child of
arch Report #53. August 1973.

interpretive framework of cognitive structures. Occasional Paper #19. June 1973.

LDS (Minnesota Early Language Development Sequence) glossary of rebuses and signs.
8. June 1973.

ons of orienting response, response latency and stimulus choice in children's learning.
. May 1973.

utomaticity, reading and mental retardation. Occasional Paper #17. May 1973.

elationships among IQ, learning ability, and reading achievement. Occasional Paper #16.

The early maternal linguistic environment of normal and Down's Syndrome (Mongoloid) language
Research Report #51. May 1973.

46. T. Archwamety & S. Samuels. A mastery based experimental program for teaching mentally recognition and reading comprehension skills through use of hypothesis/test proced May 1973.

47. W. Bart. The process of cognitive structure complexification. Research Report #49. A

48. B. Best. Classificatory development in deaf children: Research on language and cognit Paper #15. April 1973.

49. R. Riegel, A. Taylor, & F. Danner. The effects of training in the use of grouping stra memory capabilities of young EMR children. Research Report #48. April 1973.

50. J. Turnure & M. Thurlow. The latency of forward and backward association responses in Research Report #47. March 1973.

51. R. Riegel & A. Taylor. Strategies in the classroom: A summer remedial program for you Occasional Paper #14. March 1973.

52. D. Moores. Early childhood special education for the hearing impaired. Occasional Pa

53. R. Riegel & A. Taylor. A comparison of conceptual strategies for grouping and remembe mentally retarded and non-retarded children. Research Report #46. February 1973

54. J. Rynders. Two basic considerations in utilizing mothers as tutors of their very you retarded children. Occasional Paper #12. January 1973.

55. R. Bruininks, J. Rynders & J. Gross. Social acceptance of mildly retarded pupils in r classes. Research Report #45. January 1973.

56. J. Turnure & M. Thurlow. The effects of interrogative elaborations on the learning of Research Report #44. January 1973. (Proceedings of the International Associatio of Mental Deficiency, in press).

57. J. Turnure & S. Samuels. Attention and reading achievement in first grade boys and gi November 1972. (Journal of Educational Psychology, 1974, 66, 29-32).

58. R. Riegel, A. Taylor, S. Clarren, & F. Danner. Training educationally handicapped chi grouping strategies for the organization and recall of categorizable materials. November 1972.

59. R. Riegel, F. Danner, & A. Taylor. Steps in sequence: Training educationally handica gies for learning. Development Report #2. November 1972.

Samuels. *A mastery based experimental program for teaching mentally retarded children word*
d reading comprehension skills through use of hypothesis/test procedures. Research Report #50.

ess of cognitive structure complexification. Research Report #49. April 1973.

catory development in deaf children: Research on language and cognitive development. Occasional
pril 1973.

or, & F. Danner. *The effects of training in the use of grouping strategy on the learning and*
lities of young EMR children. Research Report #48. April 1973.

urlow. *The latency of forward and backward association responses in an elaboration task.*
rt #47. March 1973.

lor. *Strategies in the classroom: A summer remedial program for young handicapped children.*
per #14. March 1973.

childhood special education for the hearing impaired. Occasional Paper #13. February 1973.

lor. *A comparison of conceptual strategies for grouping and remembering employed by educable*
rded and non-retarded children. Research Report #46. February 1973.

asic considerations in utilizing mothers as tutors of their very young retarded or potentially
dren. Occasional Paper #12. January 1973.

ynders & J. Gross. *Social acceptance of mildly retarded pupils in resource rooms and regular*
earch Report #45. January 1973.

urlow. *The effects of interrogative elaborations on the learning of normal and EMR children.*
rt #44. January 1973. (*Proceedings of the International Association for the Scientific Study*
iciency, in press).

muels. *Attention and reading achievement in first grade boys and girls.* Research Report #43.
. (*Journal of Educational Psychology*, 1974, *66*, 29-32).

or, S. Clarren, & F. Danner. *Training educationally handicapped children to use associative*
tegies for the organization and recall of categorizable materials. Research Report #42.
.

er, & A. Taylor. *Steps in sequence: Training educationally handicapped children to use strate-*
ning. Development Report #2. November 1972.

60. A. Taylor, M. Thurlow, & J. Turnure. The teacher's introduction to: The Math Vocabulary Pr
Report #1. March 1973.

61. J. Turnure & M. Thurlow. The effects of structural variations in elaboration on learning by
dren. Research Report #41. September 1972.

62. A. Taylor & N. Bender. Variations of strategy training and the recognition memory of EMR ch
#40. September 1972. (American Educational Research Journal, in press.)

63. D. Moores, C. McIntyre, & K. Weiss. Evaluation of programs for hearing impaired children:
Research Report #39. September 1972.

64. R. Rubin. Follow-up of applicants for admission to graduate programs in special education.
#11. July 1972.

65. D. Moores. Communication -- Some unanswered questions and some unquestioned answers. Occas
July 1972.

66. A. Taylor & S. Whitely. Overt verbalization and the continued production of effective elabo
dren. Research Report #38. June 1972. (American Journal of Mental Deficiency, in pre

67. R. Riegel. Measuring educationally handicapped children's organizational strategies by samp
Research Report #37. May 1972.

68. E. Gallistel, M. Boyle, L. Curran, & M. Hawthorne. The relation of visual and auditory apti
low readers' achievement under sight-word and systematic phonic instruction. Research

69. E. Gallistel & P. Fischer. Decoding skills acquired by low readers taught in regular classr
techniques. Research Report #35. May 1972.

70. J. Turnure & M. Thurlow. Verbal elaboration in children: Variations in procedures and desi
March 1972.

71. D. Krus & W. Bart. An ordering-theoretic method of multidimensional scaling of items. Rese
1972.

72. J. Turnure & S. Larsen. Effects of various instruction and reinforcement conditions on the
position oddity problem by nursery school children. Research Report #32. March 1972.

73. J. Turnure & S. Larsen. Outerdirectedness in mentally retarded children as a function of se
sex of subject. Research Report #31. March 1972.

& J. Turnure. The teacher's introduction to: The Math Vocabulary Program. Development 1973.

. The effects of structural variations in elaboration on learning by normal and EMR chil- port #41. September 1972.

Variations of strategy training and the recognition memory of EMR children. Research Report 72. (American Educational Research Journal, in press.)

& K. Weiss. Evaluation of programs for hearing impaired children: Report of 1971-72. 9. September 1972.

applicants for admission to graduate programs in special education. Occasional Paper

on -- Some unanswered questions and some unquestioned answers. Occasional Paper #10.

Overt verbalization and the continued production of effective elaborations by EMR chil- port #38. June 1972. (American Journal of Mental Deficiency, in press.)

ducationally handicapped children's organizational strategies by sampling overt groupings. 7. May 1972.

L. Curran, & M. Hawthorne. The relation of visual and auditory aptitudes to first grade vement under sight-word and systematic phonic instruction. Research Report #36. May 1972.

er. Decoding skills acquired by low readers taught in regular classrooms using clinical rch Report #35. May 1972.

. Verbal elaboration in children: Variations in procedures and design. Research Report #34.

ordering-theoretic method of multidimensional scaling of items. Research Report #33. March

Effects of various instruction and reinforcement conditions on the learning of a three- oblem by nursery school children. Research Report #32. March 1972.

Outerdirectedness in mentally retarded children as a function of sex of experimenter and esearch Report #31. March 1972.

74. J. Rynders & M. Horrobin. A mobile unit for delivering educational services to Down's Research Report #30. January 1972. (Presented at Council for Exceptional Childre ence, Memphis, December, 1971.)

75. F. Danner & A. Taylor. Pictures and relational imagery training in children's learning December 1971. (Journal of Experimental Child Psychology, in press.)

76. J. Turnure & M. Thurlow. Verbal elaboration phenomena in nursery school children. Res 1971. (Study II: Proceedings of 81st Annual Convention of the American Psycholog

77. D. Moores & C. McIntyre. Evaluation of programs for hearing impaired children: Progre Report #27. December 1971.

78. S. Samuels. Success and failure in learning to read: A critique of the research. Occ 1971. (In M. Kling, The Literature of Research in Reading with Emphasis on Modes,

79. S. Samuels. Attention and visual memory in reading acquisitions. Research Report #26.

80. J. Turnure & M. Thurlow. Verbal elaboration and the promotion of transfer of training children. Research Report #25. November 1971. (Journal of Experimental Child Ps

81. A. Taylor, M. Josberger, & S. Whitely. Elaboration training and verbalization as fact children's recall. Research Report #24. October 1971. (Journal of Educational

82. W. Bart & D. Krus. An ordering-theoretic method to determine hierarchies among items. September 1971.

83. A. Taylor, M. Josberger, & J. Knowlton. Mental elaboration and learning in retarded ch #22. September 1971. (Mental Elaboration and Learning in EMR children. America Deficiency, 1972, 77, 69-76.)

84. J. Turnure & S. Larsen. Outerdirectedness in educable mentally retarded boys and girls September 1971. (American Journal of Mental Deficiency, in press.)

85. R. Bruininks, T. Glaman, & C. Clark. Prevalency of learning disabilities: Findings, Research Report #20. June 1971. (Presented at Council for Exceptional Children April, 1971.)

86. M. Thurlow & J. Turnure. Mental elaboration and the extension of mediational research phenomena in the mentally retarded. Research Report #19. June 1971. (Journal o Psychology, 1972, 14, 184-195.)

87. G. Siegel. Three approaches to speech retardation. Occasional Paper #8. May 1971.

rrobin. *A mobile unit for delivering educational services to Down's Syndrome (Mongoloid) infants.*
rt #30. January 1972. (Presented at Council for Exceptional Children, Special National Confer-
, December, 1971.)

lor. *Pictures and relational imagery training in children's learning.* Research Report #29.
. (*Journal of Experimental Child Psychology*, in press.)

urlow. *Verbal elaboration phenomena in nursery school children.* Research Report #28. December
II: *Proceedings of 81st Annual Convention of the American Psychological Association*, 1973, 83-84.)

ntyre. *Evaluation of programs for hearing impaired children: Progress report 1970-71.* Research
December 1971.

ss and failure in learning to read: A critique of the research. Occasional Paper #9. November
Kling, *The Literature of Research in Reading with Emphasis on Modes*, Rutgers University, 1971.)

tion and visual memory in reading acquisitions. Research Report #26. November 1971.

urlow. *Verbal elaboration and the promotion of transfer of training in educable mentally retarded*
search Report #25. November 1971. (*Journal of Experimental Child Psychology*, 1973, *15*, 137-148.)

erger, & S. Whitely. *Elaboration training and verbalization as factors facilitating retarded*
call. Research Report #24. October 1971. (*Journal of Educational Psychology*, in press.)

An ordering-theoretic method to determine hierarchies among items. Research Report #23.
1.

erger, & J. Knowlton. *Mental elaboration and learning in retarded children.* Research Report
er 1971. (Mental Elaboration and Learning in EMR children. *American Journal of Mental*
972, *77*, 69-76.)

rsen. *Outerdirectedness in educable mentally retarded boys and girls.* Research Report #21.
1. (*American Journal of Mental Deficiency*, in press.)

laman, & C. Clark. *Prevalency of learning disabilities: Findings, issues, and recommendations.*
rt #20. June 1971. (Presented at Council for Exceptional Children Convention, Miami Beach,

rnure. *Mental elaboration and the extension of mediational research: List length of verbal*
the mentally retarded. Research Report #19. June 1971. (*Journal of Experimental Child*
972, *14*, 184-195.)

approaches to speech retardation. Occasional Paper #8. May 1971.

88. D. Moores. An investigation of the psycholinguistic functioning of deaf adolescents. Rese
1971. (Exceptional Children, 1970, 36, 645-652.)

89. D. Moores. Recent research on manual communication. Occasional Paper #7. April 1971. (Ke
of Communication Disorders, Council for Exceptional Children Annual Convention, Miami

90. J. Turnure, S. Larsen, & M. Thurlow. Two studies on verbal elaboration in special populati
brain injury; II. Evidence of transfer of training. Research Report #17. April 1971.
Journal of Mental Deficiency, 1973, 78, 70-76.)

91. R. Bruininks & J. Rynders. Alternatives to special class placement for educable mentally r
Occasional Paper #6. March 1971. (Focus on Exceptional Children, 1971, 3, 1-12.)

92. D. Moores. Neo-oralism and the education of the deaf in the Soviet Union. Occasional Pape
(Exceptional Children, 1972, 39, 377-384.)

93. D. Feldman, B. Marrinan, & S. Hartfeldt. Unusualness, appropriateness, transformation and
for creativity. Research Report #16. February 1971. (American Educational Research A
ference, New York, February 1971.)

94. P. Broen & G. Siegel. Variations in normal speech disfluencies. Research Report #15. Jan
Speech, in press.)

95. D. Feldman. Map understanding as a possible crystallizer of cognitive structures. Occasio
1971. (American Educational Research Journal, 1971, 3, 484-502.)

96. J. Rynders. Industrial arts for elementary mentally retarded children: An attempt to rede
Occasional Paper #3. January 1971.

97. D. Moores. Education of the deaf in the United States. Occasional Paper #2. November 197
of Defectology, 1971, published in Russian.)

98. R. Bruininks & C. Clark. Auditory and learning in first-, third-, and fifth-grade children
November 1970.

99. R. Bruininks & C. Clark. Auditory and visual learning in first grade educable mentally ret
Research Report #13. November 1970. (American Journal of Mental Deficiency, 1972, 76

100. R. Bruininks. Teaching word recognition to disadvantaged boys with variations in auditory
abilities. Research Report #12. November 1970. (Journal of Learning Disabilities, 1

101. R. Bruininks & W. Lucker. Change and stability in correlations between intelligence and re
among disadvantaged children. Research Report #11. October 1970. (Journal of Readin
295-305.

ation of the psycholinguistic functioning of deaf adolescents. Research Report #18. May
l Children, 1970, 36, 645-652.)

arch on manual communication. Occasional Paper #7. April 1971. (Keynote Address, Division
isorders, Council for Exceptional Children Annual Convention, Miami Beach, April 1971.)

& M. Thurlow. Two studies on verbal elaboration in special populations. I. The effects of
Evidence of transfer of training. Research Report #17. April 1971. (Study I: American
Deficiency, 1973, 78, 70-76.)

rs. Alternatives to special class placement for educable mentally retarded children.
6. March 1971. (Focus on Exceptional Children, 1971, 3, 1-12.)

and the education of the deaf in the Soviet Union. Occasional Paper #5. February 1971.
ren, 1972, 39, 377-384.)

, & S. Hartfeldt. Unusualness, appropriateness, transformation and condensation as criteria
esearch Report #16. February 1971. (American Educational Research Association Annual Con-
February 1971.)

Variations in normal speech disfluencies. Research Report #15. January 1971. (Language &

tanding as a possible crystallizer of cognitive structures. Occasional Paper #4. January
ducational Research Journal, 1971, 3, 484-502.)

arts for elementary mentally retarded children: An attempt to redefine and clarify goals.
3. January 1971.

f the deaf in the United States. Occasional Paper #2. November 1970. (Moscow Institute
71, published in Russian.)

. Auditory and learning in first-, third-, and fifth-grade children. Research Report #14.

. Auditory and visual learning in first grade educable mentally retarded normal children.
3. November 1970. (American Journal of Mental Deficiency, 1972, 76, No. 5, 561-567.)

14

word recognition to disadvantaged boys with variations in auditory and visual perceptual
ch Report #12. November 1970. (Journal of Learning Disabilities, 1970, 3, 30-39.)

r. Change and stability in correlations between intelligence and reading test scores
d children. Research Report #11. October 1970. (Journal of Reading Behavior, 1970, 2,

102. R. Rubin. Sex differences in effects of kindergarten attendance on development of scho
skills. Research Report #10. October 1970. (Elementary School Journal, 72, No.

103. R. Rubin & B. Balow. Prevalence of school learning & behavior disorders in a longitudi
Research Report #9. October 1970. (Exceptional Children, 1971, 38, 293-299.)

104. D. Feldman & J. Bratton. On the relativity of giftedness: An empirical study. Resear
(American Educational Research Annual Conference, New York, February 1971.)

105. J. Turnure, M. Thurlow, & S. Larsen. Syntactic elaboration in the learning & reversal
young children. Research Report #7. January 1971.

106. R. Martin & L. Berndt. The effects of time-out on stuttering in a 12-year-old boy. Re
(Exceptional Children, 1970, 37, 303-304.)

107. J. Turnure & M. Walsh. The effects of varied levels of verbal mediation on the learnin
associates by educable mentally retarded children. Research Report #5. June 1970
Journal of Mental Deficiency, 1971, 76, 60-67. Study II: American Journal of Men
306-312.)

108. J. Turnure, J. Rynders, & N. Jones. Effectiveness of manual guidance, modeling & trial
inducing instrumental behavior in institutionalized retardates. Research Report
Palmer Quarterly, 1973, 19, 49-65.)

109. J. Turnure. Reactions to physical and social distractors by moderately retarded instit
Research Report #3. June 1970. (Journal of Special Education, 1970, 4, 283-294.)

110. D. Moores. Evaluation of preschool programs: An interaction analysis model. Occasion
(Keynote Address, Diagnostic Pedagogy, International Congress on Deafness. Stockh
presented at American Instructors of the Deaf Annual Convention, St. Augustine, Fl

111. D. Feldman & W. Markwalder. Systematic scoring of ranked distractors for the assessmen
levels. Research Report #2. March 1970. (Educational and Psychological Measuren

112. D. Feldman. The fixed-sequence hypothesis: Individual differences in the development
reasoning. Research Report #1. March 1970.

ferences in effects of kindergarten attendance on development of school readiness and language
arch Report #10. October 1970. (Elementary School Journal, 72, No. 5, February, 1972.)

w. Prevalence of school learning & behavior disorders in a longitudinal study population.
rt #9. October 1970. (Exceptional Children, 1971, 38, 293-299.)

atton. On the relativity of giftedness: An empirical study. Research Report #8. August 1970.
cational Research Annual Conference, New York, February 1971.)

rlow, & S. Larsen. Syntactic elaboration in the learning & reversal of paired-associates by
n. Research Report #7. January 1971.

ndt. The effects of time-out on stuttering in a 12-year-old boy. Research Report #6. July 1970.
Children, 1970, 37, 303-304.)

lsh. The effects of varied levels of verbal mediation on the learning and reversal of paired
educable mentally retarded children. Research Report #5. June 1970. (Study I: American
ntal Deficiency, 1971, 76, 60-67. Study II: American Journal of Mental Deficiency, 1971, 76,

ders, & N. Jones. Effectiveness of manual guidance, modeling & trial and error learning for
rumental behavior in institutionalized retardates. Research Report #4. June 1970. (Merrill-
rly, 1973, 19, 49-65.)

ions to physical and social distractors by moderately retarded institutionalized children.
rt #3. June 1970. (Journal of Special Education, 1970, 4, 283-294.)

tion of preschool programs: An interaction analysis model. Occasional Paper #1. April 1970.
ess, Diagnostic Pedagogy, International Congress on Deafness. Stockholm, August 1970; also
American Instructors of the Deaf Annual Convention, St. Augustine, Florida, April 1970.

rkwalder. Systematic scoring of ranked distractors for the assessment of Piagetian reasoning
arch Report #2. March 1970. (Educational and Psychological Measurement, 1971, 31, 347-362.)

ixed-sequence hypothesis: Individual differences in the development of school related spatial
esearch Report #1. March 1970.